Textiles

AS AN AREA OF

INDUSTRIAL ARTS INSTRUCTION IN PENNSYLVANIA PUBLIC SCHOOLS

SUBJECT AREAS

Automotive	Home Mechanics	Plastics
Ceramics	Metal Forming	Sheet Metal
Electricity	Metal Machining	Textiles
Graphic Arts	Planning	Woodworking

BULLETIN 331-K
1955

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF PUBLIC INSTRUCTION • Harrisburg

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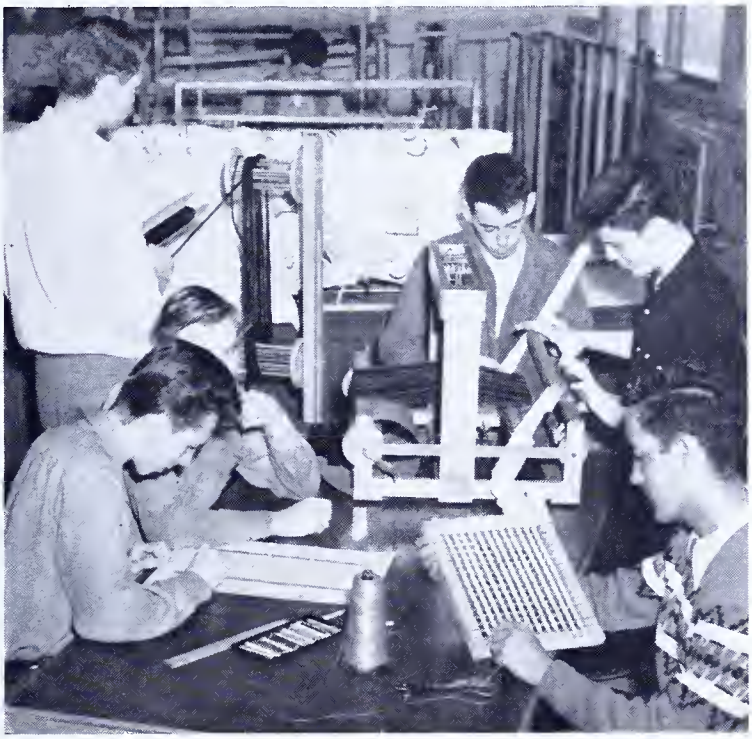

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Foreword

TEXTILES AS AN AREA OF INDUSTRIAL ARTS INSTRUCTION is one of a series of bulletins prepared to stimulate specific areas of instruction in the broad field of Industrial Arts Education. It is a supplement to *Industrial Arts in Pennsylvania,* Bulletin 331, published in September of 1951 by the Department of Public Instruction. Need for this bulletin has been manifested in requests from Pennsylvania educators for information and assistance in the area of textiles.

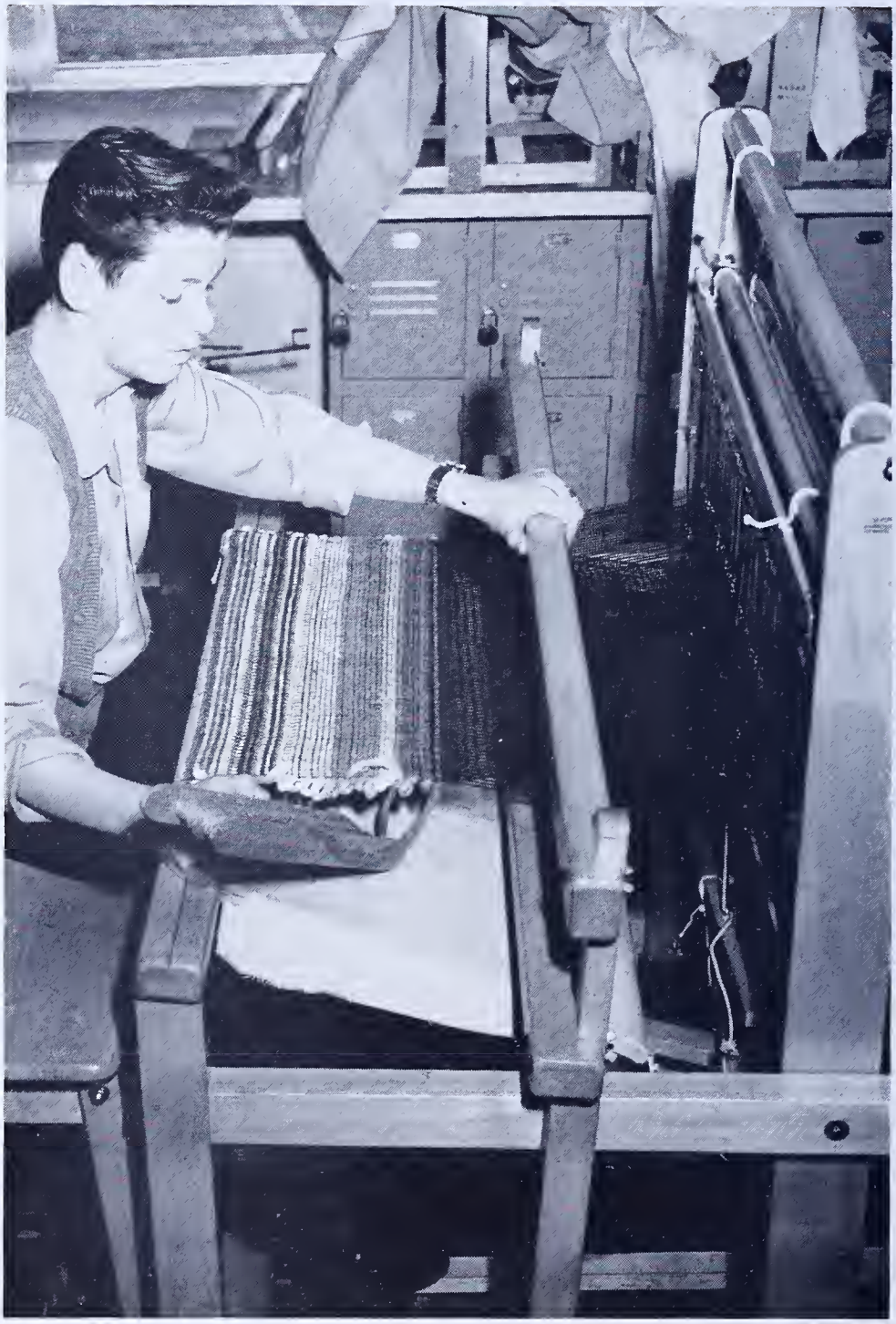
Textiles was prepared by Robert Jacoby, Area Coordinator of Trade and Industrial Education, under the supervision of George M. Schaffer, Chief of the Division of Trade and Industrial Education. Preliminary work on manuscript was done by R. Randolph Karch, Adviser, Trade and Industrial Education.

Appreciation is extended to Grace A. Post, Industrial Arts Instructor, Abraham Lincoln Junior-Senior High School, Philadelphia, for constructive suggestions and criticism in the preparation of this bulletin on instruction in textiles.

This bulletin has been edited under the supervision of Rachel S. Turner, Editor for the Department of Public Instruction.

Acting Superintendent of Public Instruction

June 1955



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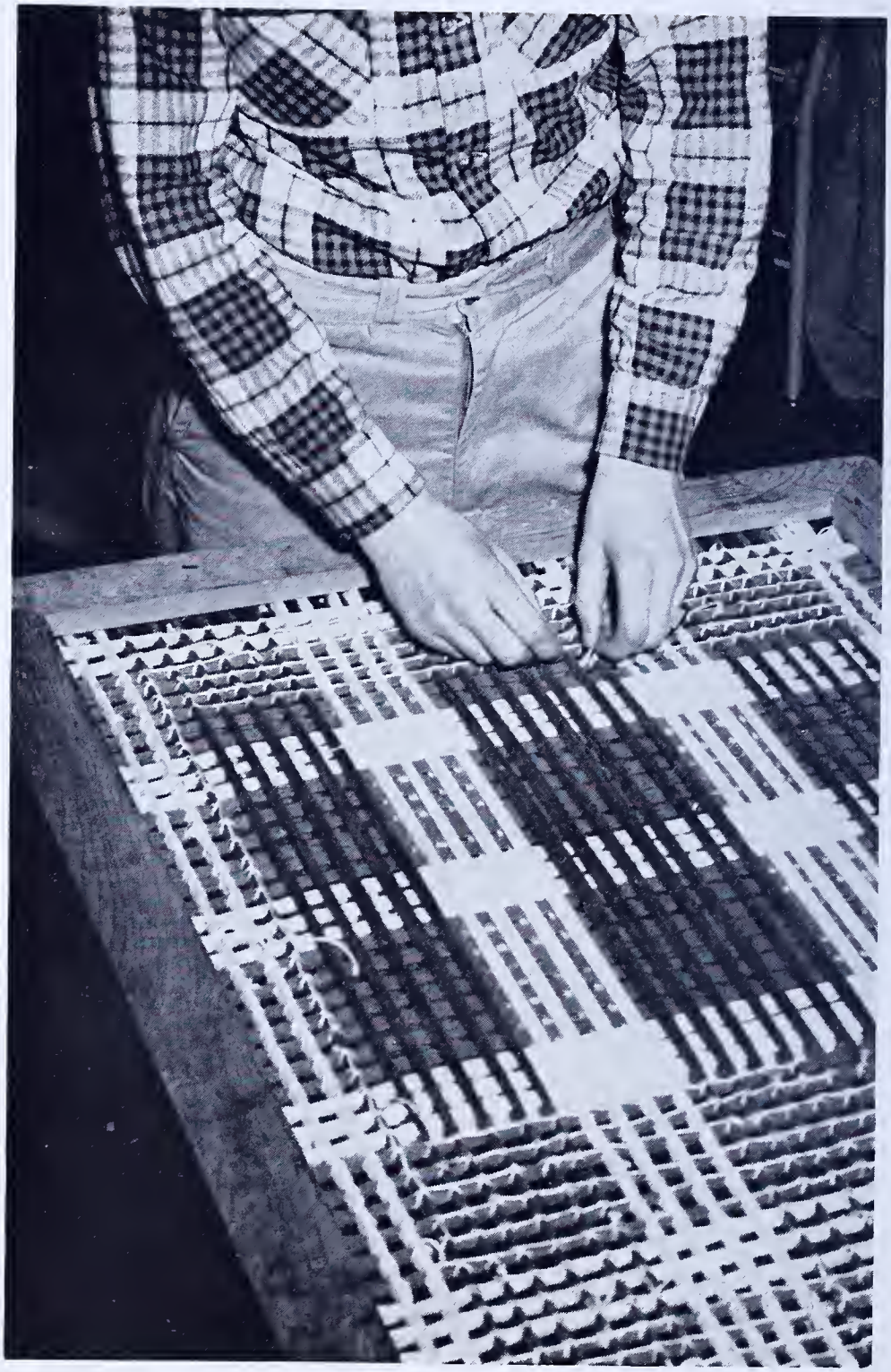


Introduction

One of the Primary Aims of Industrial Arts Instruction is to interpret industry to the pupil through exploration with tools, materials, and processes common to the field of work. The Textile Industry, the oldest, largest, and most fundamental industry in Pennsylvania, deserves a place in the Industrial Arts shops along with the more recent activities.

Because of the differences in educational concepts and backgrounds of administrator and teacher, and because of variation in the time pupils spend in the activity, in the amount of funds available for equipment and supplies, as well as other factors, no attempt is made in this bulletin to set up a common course of study applicable to all situations, or to tell the teacher what to teach, or how to teach, or what equipment he should have in his shop. From the "Doing and Knowing" section of this bulletin, pages 5 through 25, the teacher may select the course content which best serves his particular aims and objectives.

Suggestions are made to guide the administrator in the organization of instruction, instructional material, tools and devices, possible projects, sample job assignments, and the use of such records and forms as a sample information sheet and an operation sheet. For further guidance a selected annotated bibliography of readily available instructional materials and visual aids, a suggested inventory of equipment and supplies and their approximate cost, a shop layout, and other information related to establishing or enriching the Textile Area of a comprehensive general shop, or a unit (one activity) shop are included.

For further information pertaining to Industrial Arts in general, the reader is referred to Bulletin 331, *Industrial Arts in Pennsylvania*, published by the Department of Public Instruction, September, 1951.

1 Textiles

AS A SCHOOL SUBJECT

The Textile Industry is one of the largest industries in the United States and one of the oldest in the world. It is not known exactly when weaving fibers into cloth began; however, the idea probably came from the weaving of grass into mats and baskets. Fine linen cloth has been found in tombs used as early as 4000 B. C.

Before the age of industry, family clothing and household linens were made in the home. Fibers were spun into yarn, woven into cloth, and sewed into garments. Later, groups of families worked together in making cloth and, finally, a number of workmen assembled in a single building and worked for wages. The Textile Industry was the first to develop the typical factory form of organization.

Today the Textile Industry ranks as the second largest industry in the United States. It ranks just below the food and food products industry in value of output. That tailoring and garment manufacture are the largest divisions of the industry is evidenced by the fact that the family today spends an average of 15 per cent of its annual income on clothes. In Pennsylvania, 7.3 per cent of the total number of employed persons work in some branch of the textile industry. In this State 3.7 per cent of the men employed and 16.4 per cent of the women employed work in textile fabrication, textile manufacture, or with textile mill products, such as apparel.

Instruction in textiles begins in the elementary school while studying history and geography. The modern man-made developments of rayon and nylon are taught in chemistry classes; design and colors of fabrics are a part of art instruction. In home economics, the pupil learns about household textiles and the choice and cost of clothing. The Industrial Arts shop is the logical place to provide the practical experiences in working with textile materials and processes.

Although Textiles is a comparatively new area of instruction, it is a significant part of modern industry and provides numerous and varied employment opportunities for men and women as well as avocational and leisure time interest in many communities. The textile field represents an area of instruction important to every boy and girl in the secondary school, and instruction should be promoted to the same degree as other more common industrial arts activities.

Aims and Objectives

If instruction is to be purposeful, aims and objectives must be developed to provide a basis for the choice of subject matter and serve as a means for the evaluation of progress in the subject.

Textiles as a unit of instruction in a comprehensive general shop will strengthen and broaden the program, and will help to fulfill the general objectives of Industrial Arts as stated in *Industrial Arts in Pennsylvania,* Bulletin 331, published by the Department of Public Instruction in 1951. Because of the nature of the textile activity, there is opportunity to give emphasis to certain specific objectives such as creative expression, leisure time interest, color and design, and consumer knowledge.

The more specific aims and objectives of instruction in textiles in the Industrial Arts program are:

1. To understand the contributions and technological advances made by the Textile Industry in our industrial society
2. To learn about the many occupations and job opportunities available in the textile field
3. To provide exploratory experiences and knowledge of tools, materials, and methods of production common to the Textile Industry
4. To assist the pupil in the intelligent selection of an avocational or leisure time interest
5. To provide an opportunity for the creative study and application of color and design
6. To provide experiences and information to aid the pupil in the selection, use, care, and repair of textile products

Tools, Materials, and Processes

A wide variety of materials should be used to meet the broad objectives of Industrial Arts and to provide the pupil with the media for desirable experiences.

Few basic hand tools are required to teach textiles in the school shop. Several pieces of equipment can be constructed by pupils in other shop activities. Knitting machines and weaving looms are hand-operated but show the same basic principles as the large production-type machines used in industry. Knitting, weaving, and garment-making are industries which involve the use of some of the most ingenious machines found in industry. The speed and efficiency of these mechanical devices are difficult for the layman to compre-

hend. Even though the small textiles unit of a comprehensive general shop is limited in equipment and tools, much can be taught about present-day methods and processes in the textile field.

The problem of scheduling or fitting textiles into an Industrial Arts program presents problems that do not arise in most other areas of work. Since a loom is available to only one pupil during the time the pupil is working on a particular article, it is necessary to give careful consideration to the choice of projects and to the pupil's willingness to work hard to complete the job.

Occupations

The lack of clear-cut objectives of many high school pupils and the fact that the average graduate takes ten years and seven jobs to find his place in industry, indicate the importance of proper occupational guidance in the secondary school program. Acquiring a comprehensive view of occupational fields is an increasingly difficult task, since the rapid change in problems of industry makes keeping pace with occupational changes more difficult. Young people, faced with the problem of choosing a vocation, naturally consider those fields of work with which they are most familiar. Industrial Arts instruction can provide a breadth of occupational understanding to assist the boy or girl to determine occupational interests and abilities through practical experience with tools, materials, and processes of the occupational fields. In addition, knowledge and information concerning occupations within the Textile Industry can be given. This information should include not only a listing of occupations, but also an understanding of the working conditions, wages, preparation, required training, local employment possibilities, opportunities for advancement, and advantages and disadvantages in the various fields of work. This information is important because the nature of work and qualifications for jobs in the textile field have changed. Recent changes in labor laws and improved technical developments in industry demand more intelligent and better-trained workers.

The occupational career of each pupil should, therefore, be planned rather than left to chance following graduation. This is accomplished by providing broad areas of Industrial Arts exploration and understanding in the junior high school program. As the pupil approaches the advanced years of senior high school, the occupational objective of the pupil narrows and finally crystallizes as a result of planned instruction.

There are many types of jobs in the Textile Industry which offer excellent opportunities to men and women. The cloth manufacturing industry needs mill engineers, laboratory technicians, artists for fabric designing, and machine operators. The clothing manufacturing industry needs pattern designers, cutters, machine maintenance men, machine operators, finishers, and inspectors. Inasmuch as the Textile Industry is the nation's second largest industry, many opportunities exist in related occupational fields such as business, labor management, advertising, selling, art, and research.

Textiles in the Comprehensive General Shop

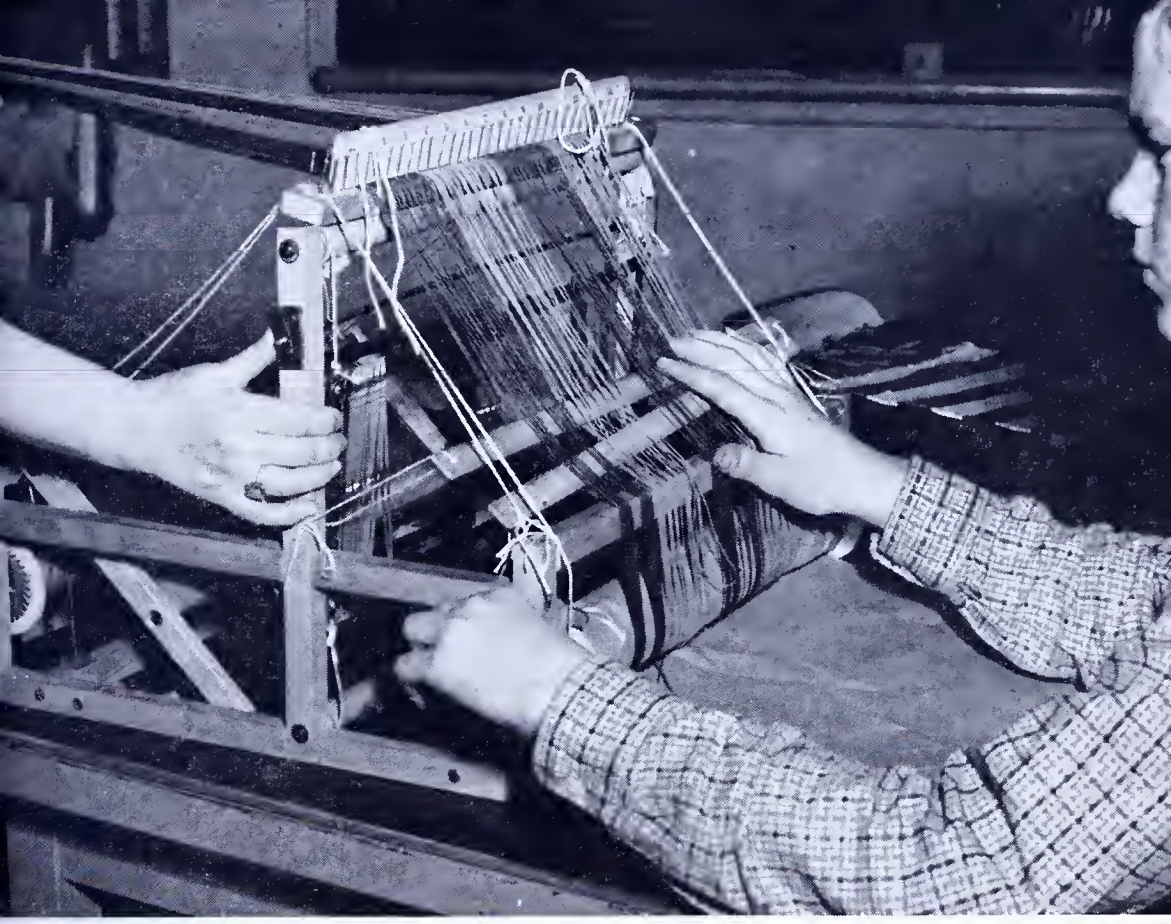
This bulletin is concerned primarily with textiles as an integral part of at least four activities in a comprehensive general Industrial Arts shop. Such a shop should be equipped to provide work stations for five pupils. The Textile Area may be combined with any of the other Industrial Arts activities, although when combined with dust-producing areas, it should be located behind glass partitions. Graphic arts, drawing and planning, and electricity are activities which could be included in the Textile Area.

Subareas suggested for the textile activity in the comprehensive general shop are rope and net work, fibers and yarns, textile design, weaving, dyeing and printing, textile fabrication, rugmaking, and machine knitting.

The teacher of textiles in either the comprehensive general shop or the unit shop (see page 52, *Industrial Arts in Pennsylvania,* Bulletin 331) may select any or all of the subareas which meet the needs of his objectives. The amount of time available to pupils and the availability of equipment and supplies must also be taken into consideration.

Textiles as a General Unit Shop

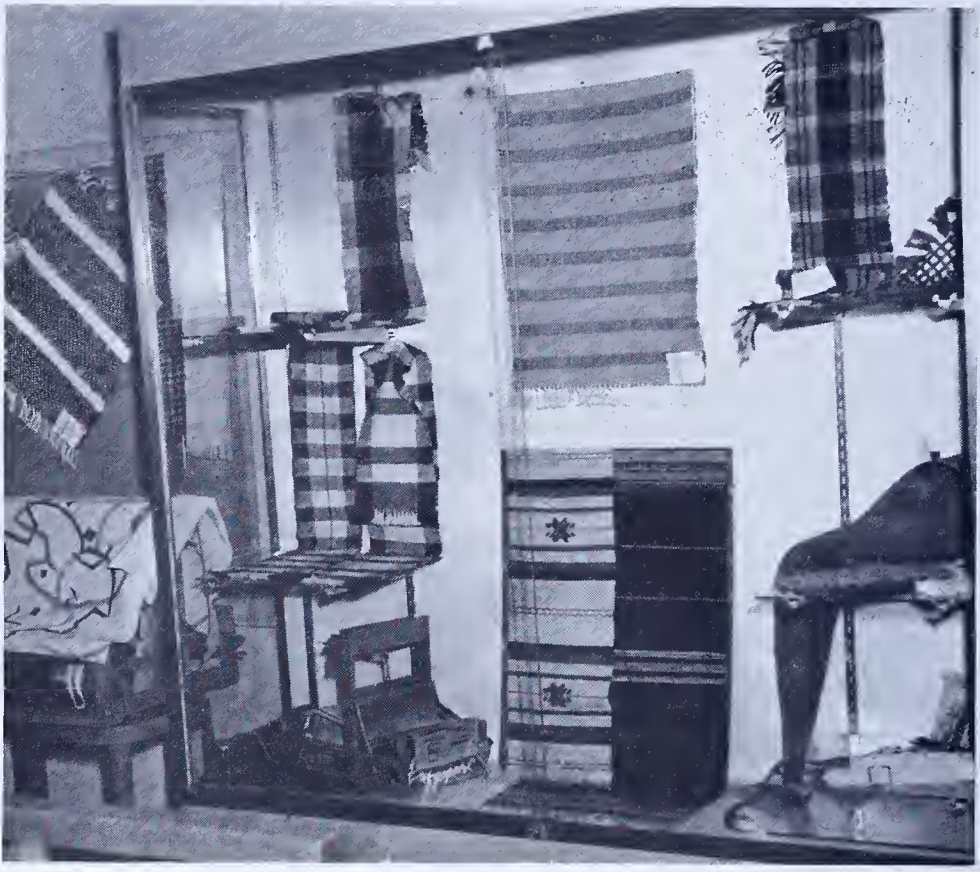
Since the general textiles field includes a number of subareas, many of which are major occupational fields in themselves, it is possible to operate this area of instruction as a "unit shop" (one activity). This is particularly true in the larger school districts requiring many shops to meet the needs of the pupil capacity of the building. Whether this type of shop is entirely feasible is determined by the teacher's ability and knowledge of the activities, the time allotted to pupils in the shop, and available equipment and supplies.



2 Learning Units

THINGS TO DO AND THINGS TO KNOW

The Selection of Subject Matter for an Industrial Arts activity is based on a study of the processes of the industry. From this study a list of the manipulative or practical "doing" units as well as the informational or "knowing" content can be made. The following learning units are based on those experiences which are representative of and fundamental to an understanding of the Textile Industry, and contribute to the objectives of a course in textiles. The final result is a list of learning units which represent the things a pupil should be able to *do* and the things he should *know*. The individual teacher must carefully select those learning units adapted to the various grade levels and carry out the objectives of the course. The list is sufficiently comprehensive to challenge the initiative and ability of pupils who wish to pursue Textiles as a major activity in the senior high school.



The learning units are classified under the following general divisions:

Unit A. Rope and net work	Unit E. Dyeing and printing
Unit B. Fibers and yarns	Unit F. Textile fabrication
Unit C. Textile design	Unit G. Rugmaking
Unit D. Weaving	Unit H. Machine knitting

The processes learned in one unit are often applied in one or more of the other units. For example, rope and knot work is applied in netting and weaving. Dyeing and printing are also applied in weaving and rugmaking, and the cloth produced in the weaving unit is used in the construction of a project in the textile fabrication activity.

The textile fabrication activity provides the greatest opportunity for an expression of interest and ability at the various pupil levels. The average pupil may explore pattern designing from the commercial patterns, do simple hand and machine sewing, and perform a number of the fundamental sewing operations.

More advanced pupils may weave the fabric, select a garment to be made, study pattern design by making a pattern, outline the fundamental tailoring operations involved, and finally apply the operations in the construction of the finished garment.

A LIST OF SUGGESTED TEXTILE PROJECTS

The following projects require the "doing and knowing" processes listed in the units which follow: (pp. 8 to 26)

Unit A—Rope and Net Work

Aquarium net
Badminton net
Bag
Belt
Cigarette case
Fish-carrying net
Fruit bag
Grocery bag
Hammock
Lawn tennis net
Purse
Scarf
Table tennis net
Window shade pull

Unit B—Fibers and Yarns

Things to know in identifying different types of fibers and yarns

Unit C—Textile Design

Things to know in designing patterns for textiles

Unit D—Weaving

Belt
Book strap
Book cover
Curtain tieback
Bath mat
Dresser scarf
Flower vase mat
Hat band
Handkerchief case
Hot pad holder
Knitting bag
Napkin
Necktie
Pin cushion
Purse
Pillow cover
Place mat
Rug
Scarf
School bag
Shopping bag
Table mat
Towel

Unit E—Dyeing and Printing

Banners
Clothing
Draperies
Handkerchief
Lamp shade
Necktie
Napkin
Place mat
Pillow case
T shirt

Unit F—Textile Fabrication

Apron
Arm protector
Banner
Baseball bases
Baseball cap
Clothespin bag
Draperies
Fish rod case
Garment
Gun case
Hot pad
Marble bag
Necktie
Pillow
Pocketbook
Pot holder
Shoe bag
Shop apron
Shopping bag
Slip cover
Stuffed animal
Undershorts
Window curtains

UNIT G—RUGMAKING

Braided rugs
Hooked rugs
Tufted rugs
Woven rugs

UNIT H—MACHINE KNITTING

Cap
Mittens
Muffler
Scarf
Sock
Stocking
Sweater

UNIT A—ROPE AND NET WORK

Things to Do	Things to Know
1. Make a rope	a. Kinds of fibers used in rope b. Hand methods of making rope c. Production methods of rope-making d. Rope-sizing
2. Whip and splice a rope	a. Purpose of whipping a rope b. How to whip a rope end c. How to whip the middle of a rope d. Methods of rope-splicing
3. Tie common knots and hitches	a. Types of knotting cord b. Common knots and hitches c. Use of knots in weaving and net work d. Application of knots and hitches to home and industry e. Safety factors in the use of hitches and slings
4. Cast plain mesh	a. Selection of twine and size of mesh b. How to calculate number of mesh c. How to calculate mesh length d. Purpose of the headrope e. Methods of casting loops to headrope f. Methods of joining a new length of twine g. Methods of increasing and decreasing net width h. Type of nets made in plain mesh
5. Cast square mesh	a. Use of the bowline knot b. Method of starting a square mesh

UNIT A—ROPE AND NET WORK (Continued)

Things to Do	Things to Know
	c. Procedure for making a square mesh net
	d. Typical nets made in square mesh
6. Cast special mesh	a. Circular with grommet center
	b. Circular in a spiral
	c. Using several mesh
	d. Crossing stitches
7. Repair damaged nets	a. Methods of repairing damaged nets

UNIT B—FIBERS AND YARNS

Things to Do	Things to Know
1. Identify fiber types	a. Animal
	b. Plant
	c. Synthetic
2. Identify wool fibers	a. Varieties of wool
	b. Characteristics of wool fibers
	c. Methods in production of wool fibers
	d. Dyeing and blending wool
	e. Carding, spinning, processing into yarn
	f. Reprocessing used wool
3. Identify silk fibers	a. How silk is manufactured
	b. How silk fibers are processed into threads
	c. Types of silk yarns
	d. Properties of silk
4. Identify cotton fibers	a. How cotton is grown
	b. Kinds and characteristics of cotton
	c. Methods of grading cotton
	d. How cotton is processed into yarns
5. Identify linen fibers	a. Flax-growing
	b. Preparation of flax fibers
	c. Spinning linen yarn
	d. Characteristics of linen
6. Identify rayon fibers	a. Types of rayon fibers
	b. Manufacture of rayon

Things to Do	Things to Know
	c. Characteristics of rayon d. How to buy rayon fabric
7. Identify nylon fibers	a. How nylon was invented b. Types of nylon fibers c. Manufacture of nylon fibers d. Dyeing and finishing processes e. Properties and characteristics f. Buying guides g. Use of nylon in industry h. Other synthetic fibers
8. Convert fibers to thread and yarn	a. History of spinning b. Preparation of fibers for spinning c. Procedure in carding fibers d. Method of spinning on a wheel e. Production methods of making thread
9. Cloth identification	a. Use of the microscope b. How to make a thread count c. How to take fabric apart d. Methods of identifying types of yarn and fabrics
10. Test cloth	a. Methods of testing with chemicals b. Tests for wearability c. Tests for strength d. Importance of knowing shrinkage characteristics e. Method of checking shrinkage f. Method of testing cloth to learn if: (1) colorfast from sunlight (2) colorfast when laundered g. Water spot tests
11. Judge cloth, fabric, and garments	a. Type of weave b. Fabric finish and pattern c. Information on garment labels d. Shrinkage regulations e. Considerations in purchasing yard goods f. Factors in selecting a ready-made garment

UNIT B—FIBERS AND YARNS (Continued)

Things to Do	Things to Know
	g. Selection of upholsterics h. Selection of draperies
12. Care of cloth and clothes	a. Professional care b. Home care c. Seasonal care d. Care while traveling e. Airing and resting periods
13. Remove spots and stains	a. Methods of stain removal b. Types of spot removers c. Materials for and methods of removing spots and stains

UNIT C—TEXTILE DESIGN

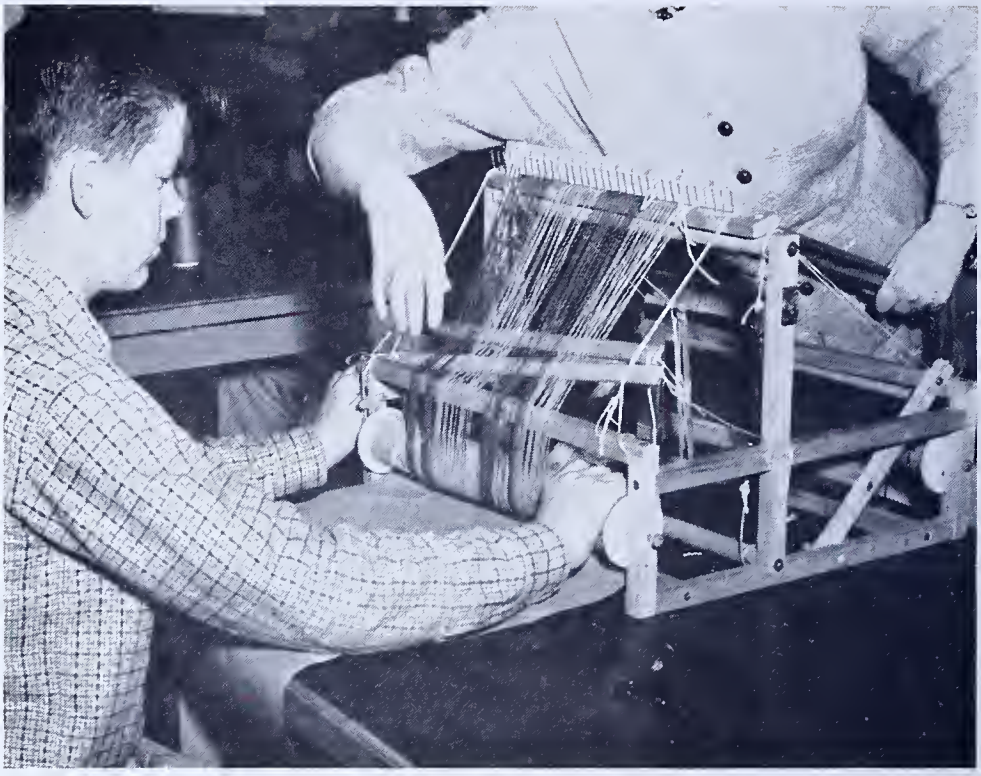
Things to Do	Things to Know
1. Make a color chart	a. Application of color to textile design b. Color c. Color and light d. How to analyze a color e. Understanding the color chart f. Classification of colors g. Color combinations h. Color contrast and harmony i. Application of color in clothing and home furnishings
2. Draw printed patterns	a. Principles of design in printed patterns b. Type and purpose of pattern c. Conventional forms d. Abstract forms e. Conventional printed patterns f. Use of color in printed patterns g. Patterns for various type cloth
3. Draw woven patterns	a. Principles of woven design b. Difference between printed and woven patterns c. Methods of using color in woven patterns

UNIT C—TEXTILE DESIGN (Continued)

Things to Do	Things to Know
4. Sketch basic weaves	a. Basic weaves—plain, twill, satin, checks, plaids, stripes b. Durability of printed and woven patterns
5. Interpret drafts	a. Meaning and function of draft b. Difference between draft, design, and pattern c. Information given on a draft d. Symbols used in draft writing e. Different methods of draft writing f. Procedure in designing a draft g. How to read a draft h. Planning color in draft design
6. Prepare two-harness draft	a. Drafts for two-harness weaving
7. Prepare four-harness draft	a. Drafts for four-harness weaving
8. Prepare a draft with a border	a. Draft designs with borders

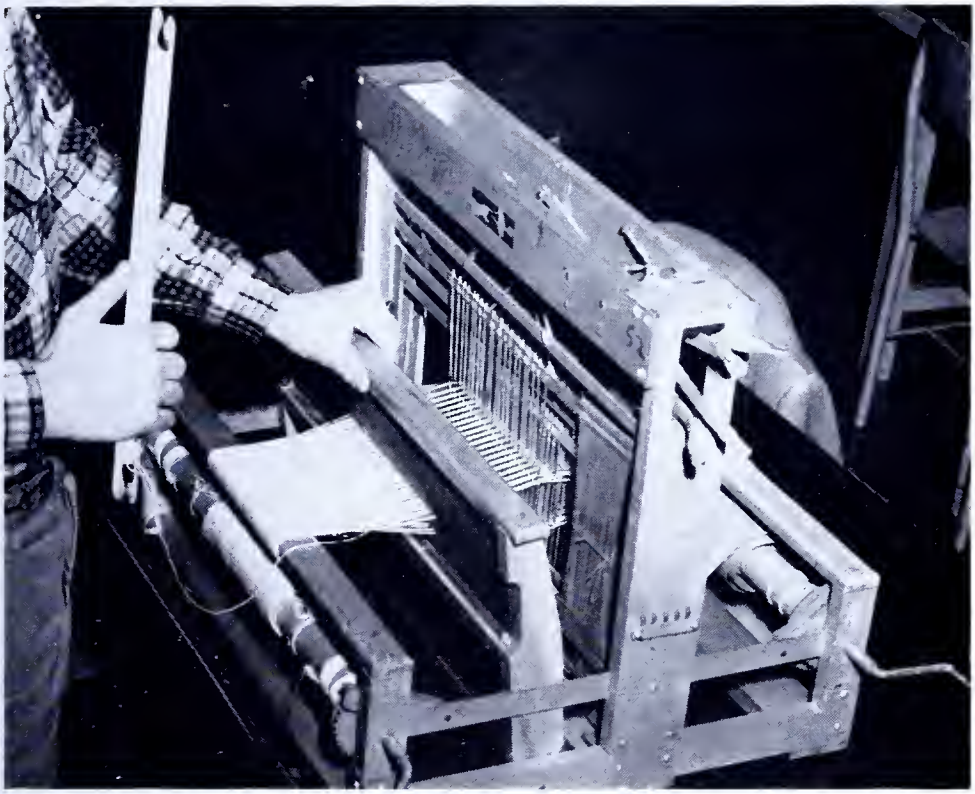
UNIT D—WEAVING

Things to Do	Things to Know
1. Plan color, pattern, texture of a woven cloth	a. The history of weaving b. Comparison of weaving and knitting c. Meaning of warp and weft d. Kinds of cloth and weaves
2. Read the thread chart	a. Suitable fibers for warp and weft b. Characteristics of thread and yarn c. Thread sizes of cotton d. Linen thread sizes e. Unit of measure for silk f. Ply of yarn
3. Calculate cost of yard of cloth	a. Units of measure for wool, cotton, and silk b. Method of determining amount of warp and weft material per yard of cloth c. Method of determining total cost of materials per yard of cloth
4. Weave without a loom	a. Types of materials used b. Weaves and pattern designs c. Method of weaving d. Typical projects
5. Mat Weaving	a. How to make a mat loom b. Types of materials used c. Designs and color arrangements d. Mat weaving procedure e. Method of finishing edge loops
6. Card loom weaving	a. How to make a card loom b. Materials used c. How to thread the card loom d. Typical designs and projects e. Procedure for card weaving
7. Identify two-harness loom parts and accessories	a. Types of looms b. Loom parts and their function c. Principles of loom operation d. Industrial-type looms



UNIT D—WEAVING (Continued)

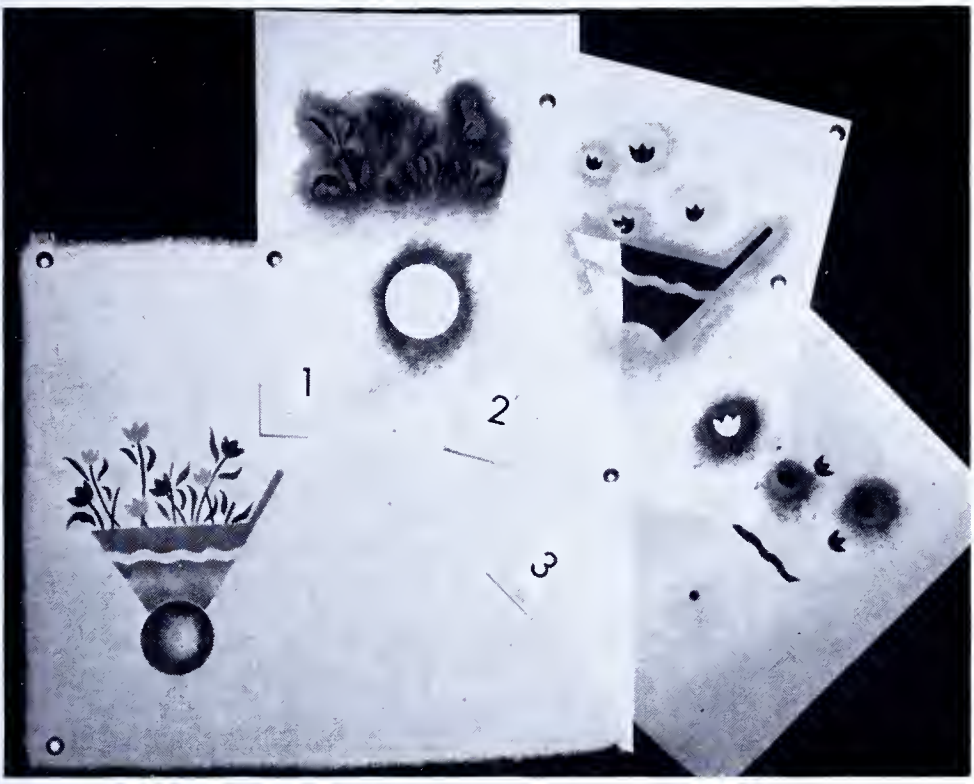
Things to Do	Things to Know
8. Warp preparation	a. Function of the warp board b. Characteristics of warp thread c. Methods of measuring length of warp d. How to chain off the warp e. Methods of tying warp threads in groups
9. Thread a two-harness loom	a. Purpose of the reed b. How to center warp in reed c. Method of threading warp through reed d. How to thread warp through harness
10. Fasten warp to rollers	a. Methods of tying warp to warp roller b. How to tie warp to cloth roll
11. Prepare weft thread	a. Selection of thread for weft b. Types of weft shuttles c. How to wind shuttles and bobbins
12. Operate a two-harness loom	a. Position at the loom b. Methods of handling shuttles



UNIT D—WEAVING (Continued)

Things to Do	Things to Know
	c. How to adjust warp tension d. How to weave a trial pattern e. How to replace a broken warp strand f. Methods of splicing weft ends g. How to piece ends at the selvage h. How to make changes in color
13. Remove cloth from loom	a. How to cut off the warp b. How to sew raw end of the fabric c. Why extra cloth is woven to leave on loom d. How to allow for fringed ends e. How to knot fringed ends f. How to trim evenly
14. Finish and process fabric	a. Washing b. Drying c. Pressing d. Warp shrinkage e. Shrinkage—selvage to selvage

Things to Do	Things to Know
	f. Method of care for hand-woven fabrics
15. Dress a four-harness loom	a. Principles of dressing a four-harness loom b. Sectional method of warping and threading c. Chain method of warping and threading d. How to thread heddles from a threading draft e. How to thread through the reed
16. Operate a four-harness loom	a. Principles of operation b. Special techniques of operation c. Special patterns for four-harness weaving
17. Correct common weaving errors	a. Improper loom dressing b. Improper tensions on warp and weft c. Faulty pattern threading d. Uneven spacing of weft rows e. Uneven shed f. Web of uneven width



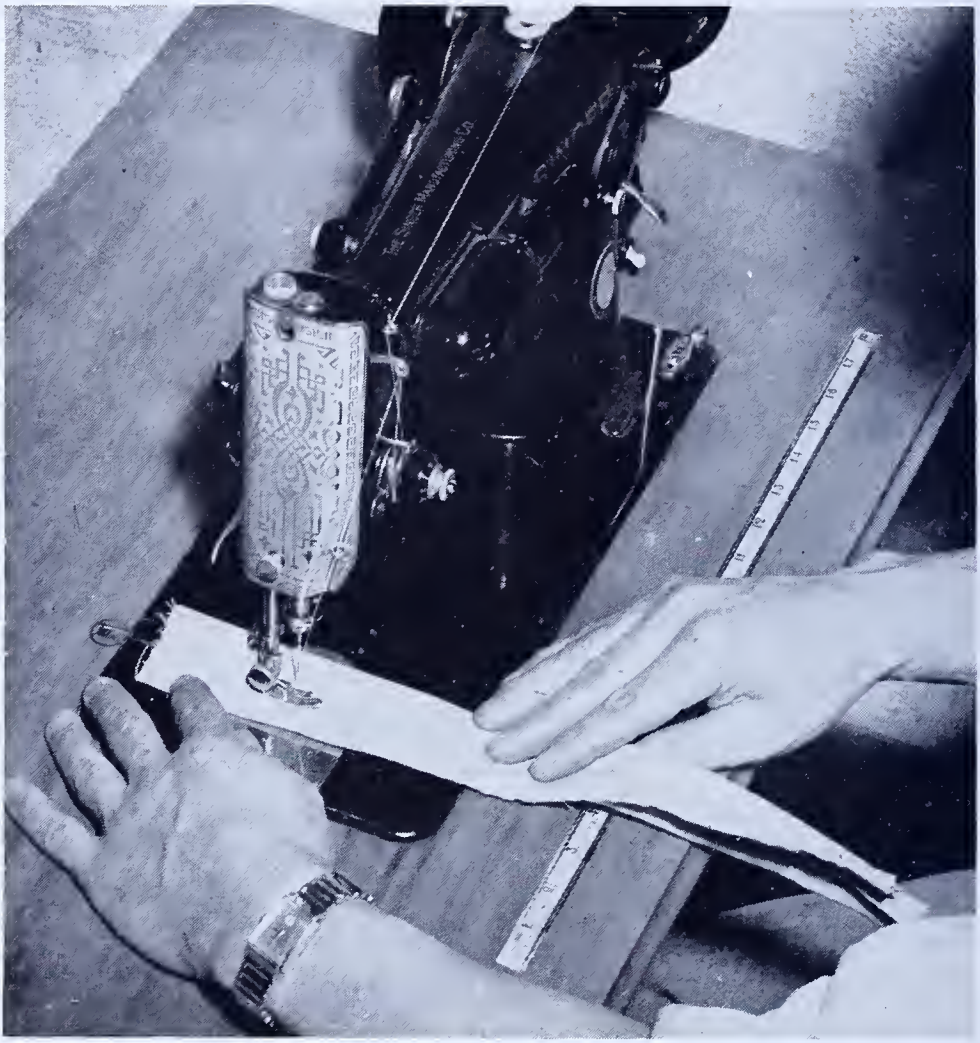
UNIT E—DYEING AND PRINTING

Things to Do	Things to Know
1. Bleach cloth	a. Purpose of bleaching b. Methods of bleaching
2. Prepare dye stock	a. Common dye plants b. Recipes for dye baths c. Types and uses of chemical dyes
3. Dye cloth or fiber	a. Procedure for vegetable dyeing b. Procedure for chemical dyeing c. Special methods of dyeing cloth d. Production methods of dyeing cloth
4. Tie-dye cloth	a. Type of dye used b. Materials adapted c. Tie-dye procedure
5. Batik dyeing	

Things to Do	Things to Know
6. Print directly on cloth	a. Hand painting b. Discharge printing c. Resist printing d. Linoleum block process e. Stenciling f. Silk screen process g. Commercial methods

UNIT F—TEXTILE FABRICATION

Things to Do	Things to Know
1. Select cloth or fabric	a. Principles of fabric selection
2. Prepare cloth for cutting	a. Right and wrong side of cloth b. Grain lines in cloth c. Types of flaws in cloth d. Methods used to sponge and shrink cloth
3. Lay out pattern on cloth	a. Use of patterns b. Marks, symbols, and directions on a commercial pattern
4. Cut cloth	a. Straight cutting b. Cutting irregular shapes c. How to cut to a corner d. How to cut hand-woven fabric
5. Simple hand sewing	a. Kinds and sizes of needles and thread b. Purpose of basting c. Common hand stitches and their use
6. Machine sewing	a. Types of power sewing machines b. Care, maintenance, and adjustment of machine c. How to set up, thread, and adjust sewing machine d. Straight seam sewing e. Sewing concave and convex curves f. Edge stitching g. Square corner stitching h. How to make bound edge and seam i. Facing j. Corded seams
7. Fabric repairs	a. Method of darning woven fabric b. Method of repairing knitted fabric c. Invisible patchwork d. Hemmed patchwork e. Overhand patchwork

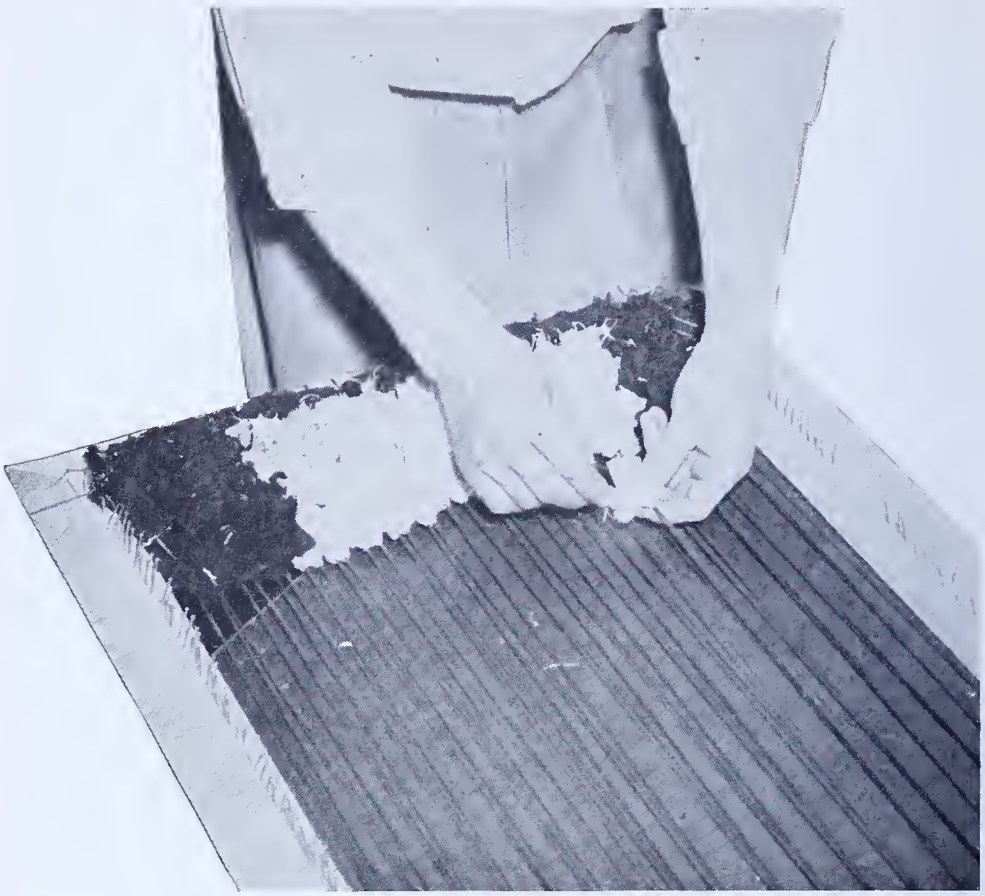


UNIT F—TEXTILE FABRICATION (Continued)

Things to Do	Things to Know
8. Press a garment	a. Purpose of pressing cloth b. Procedure for pressing wearing apparel c. Cautions in pressing various types of cloth
9. Shrink fullness from fabric	a. How to shrink fullness from woolen fabric

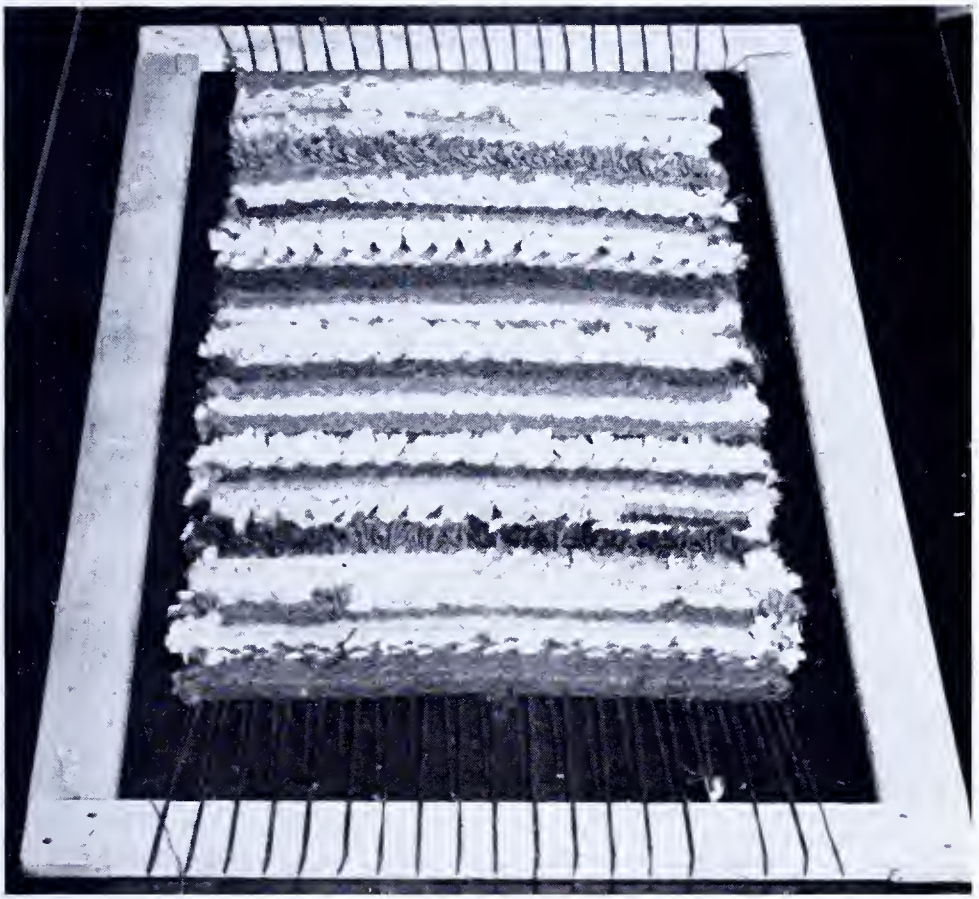
UNIT G—RUGMAKING

Things to Do	Things to Know
1. Design a handwoven rug	a. History of rugmaking b. Type and shape of rugs c. Color schemes for rugs d. Conventional design forms e. Importance of background design f. Designs for various types of construction
2. Make an interlaced braided rug	a. Tools and materials used b. Preparation of braid materials c. Procedure for braiding d. Methods of turning at an end e. Methods of turning a right-angle corner f. How to finish the end of a braid g. Methods of fastening braids together



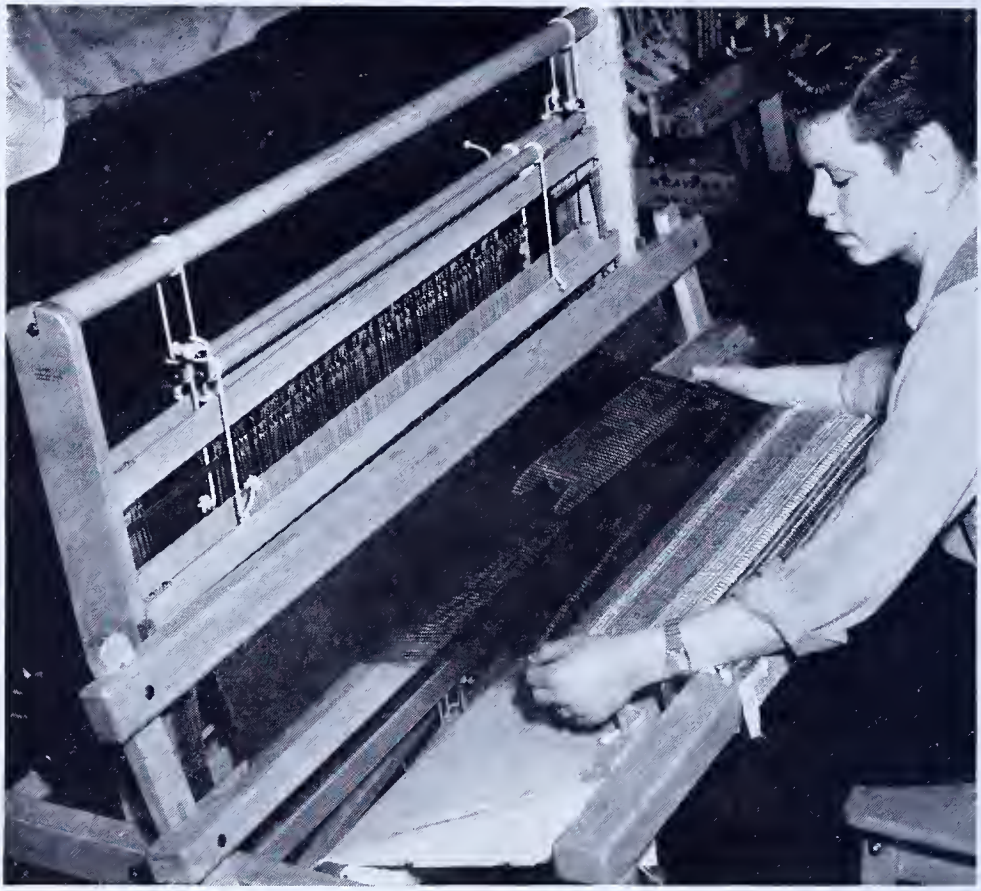
UNIT G—RUGMAKING (Continued)

Things to Do	Things to Know
3. Make a hooked rug	a. Foundation materials used b. Tools and equipment required c. Methods of fastening foundation material to frame d. Methods of transferring designs to foundation material e. The hooking technique f. How to block, press, and size a rug g. How to repair a hooked rug
4. Make a tufted rug	a. Foundation materials b. Tools used c. Types of tuft knots d. Procedure for tufting
5. Make a woven rug	a. Type materials for rug-weaving b. Types of frames and looms



UNIT G—RUGMAKING (Continued)

Things to Do	Things to Know
	c. Types of textures in plain rug weave d. Special hints in rug-weaving e. Rug weight
6. Analyze commercial rugs	a. Commercial methods of carpet manufacture (1) Preparation of wool and yarn (2) Manufacturing processes (3) Types of rug weave (4) Rug finish b. Wool blend c. Pitch and rows per inch d. Type weave e. Yarn size f. Pile height g. Backing material h. Color and design



UNIT G—RUGMAKING (Continued)

Things to Do	Things to Know
7. Clean a rug	a. Rug and carpet care b. Fluffing c. Sprouting d. Missing tufts e. Pile-crushing or shading f. Soiling and stains g. Rug-cleaning methods h. Daily, weekly, and periodic care i. Moisture control
8. Repair and restore rugs	a. How to overcast selvaged ends b. How to bind a woven edge c. How to replace a fringe d. Method of repairing holes

UNIT H—MACHINE KNITTING

Things to Do	Things to Know
1. Set up knitting machine	a. Name and use of each part of machine b. Know how stitches are formed c. Understand how cylinder needles operate d. How to thread the yarn stand e. How to thread the needles f. How to set up machine for new work g. How to replace work on machine
2. Make machine adjustments	a. Cylinder tension adjustments b. How to regulate length of stitches c. How to adjust yarn carrier d. How to remove and install needles
3. Knit plain weave	a. Method of starting work b. How to hold down work c. Method of dividing work d. How to remove dividing cotton e. Methods of measuring work f. Cautions in machine operation g. Effect of varied tension and weight of yarn h. How to form a selvaged edge i. How to pick up dropped cylinder stitches
4. Join stitches by hand	a. How to join stitches by hand
5. Finish knitted work	a. How to finish knitted work

3 Organization of Instruction

INSTRUCTIONAL MATERIAL AND DEVICES

In Textiles, as well as in other areas of instruction in Industrial Arts education, the instruction is built around shop projects —they teach what a boy or girl should know, and what he or she should be able to do.

Project Selection

Project selection in most of the Industrial Arts areas is based on the operations involved. Practical learning operations and informational units are determined and arranged so that they progress from the simple to the complex. Projects are then selected to incorporate the operations to be taught. Practical work should be assigned so that each progressive project provides the learning of new processes, methods, procedures, and the use of tools and materials which are common to the field of work and contribute to the attainment of the general objectives of the course.

Beginning projects should have a small number of basic learning units, selected by the teacher and required of all pupils as standard jobs. Such assignments are necessary in order to get the class under way without delay and confusion. Subsequent projects should include new learning units and should provide practice in the old. As pupils advance in knowledge and skills, they should be permitted to select their own projects with the advice of the teacher. Pupils may choose from a group of approved projects after they have mastered fundamental tool and machine processes and have acquired sufficient experience to make wise selections. Final approval of the selection will rest with the teacher.

In order to conform to standards, all projects should:

1. Contain most of the learning units desired
2. Be simple enough to be in the range of the pupil's ability, yet difficult enough to challenge his resourcefulness
3. Be of such nature that they can be handled under school shop conditions

4. Embody good design and have some intrinsic value to the home, school, or community
5. Be of such character that they can be completed within a reasonable or specified time
6. Have value in the pupil's estimation

Use of Records, Forms, and Charts

The Industrial Arts teacher of a comprehensive shop program is confronted with many problems pertaining to the administration of the program, details of instruction, and the handling of supplies. The problems increase as the activities in the shop become more diversified. Development of adequate record-keeping forms and charts, and the maintenance of accurate up-to-date records are an important responsibility of the Industrial Arts teacher. If properly developed, such records should also prove useful in the evaluation, development, and improvement of the instructional program. In order that the teacher does not become too much involved with record-keeping, a plan can be devised whereby pupils and teacher share the work of recording pupil progress in the learning units.

Name Grade 7 8 9 10 11 12 PG

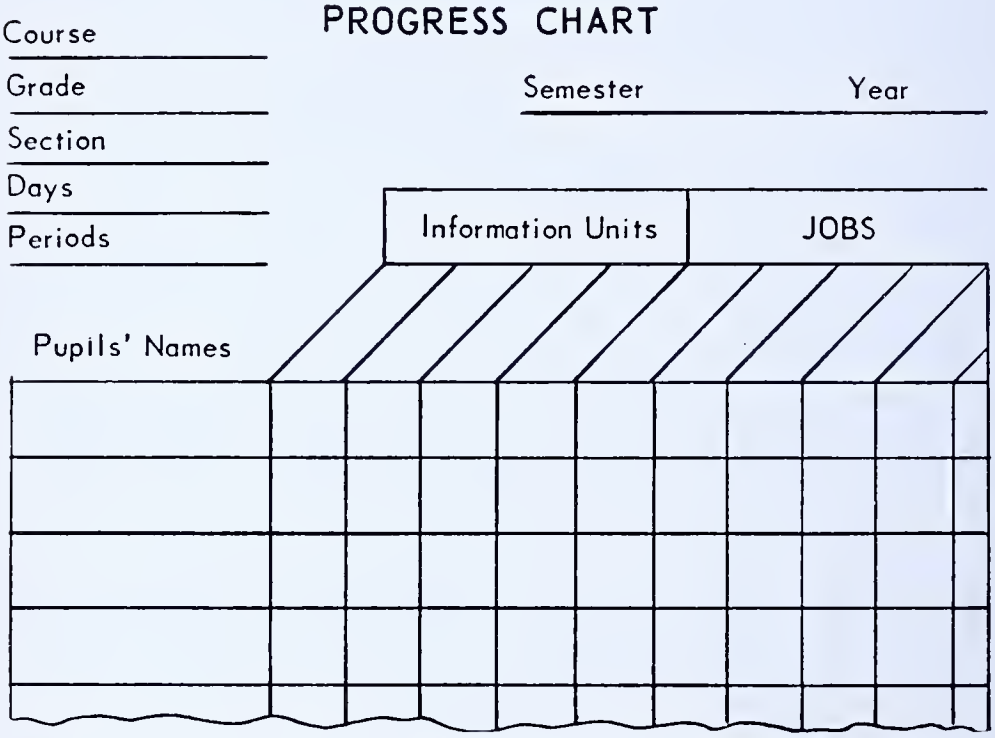
PUPIL CUMULATIVE PROJECT RECORD

Industrial Arts Department School City

Shop	Project	Activity	Date Started	Date Finished	Total Periods	Teacher	Cost	Paid	Grade

Sample of a Cumulative Project Record Form To Be Kept Throughout a Pupil's School Experience in Textiles

While projects are not considered as ends in themselves but rather as means to an end, the nature and number of projects completed by the pupil are some indication of the extent to which the objectives of the course are being met. The use of the Pupil Cumulative Project Record form shown on page 27 is particularly important in the comprehensive general shop where the activities are highly diversified.



Sample Progress Chart to Show Accomplishment of Pupils Throughout the School Year in the Textile Area

The progress chart gives teacher and pupil a picture of the work to be covered in the course; it aids in planning instruction and shows progress being made by the individual pupil as well as the entire group.

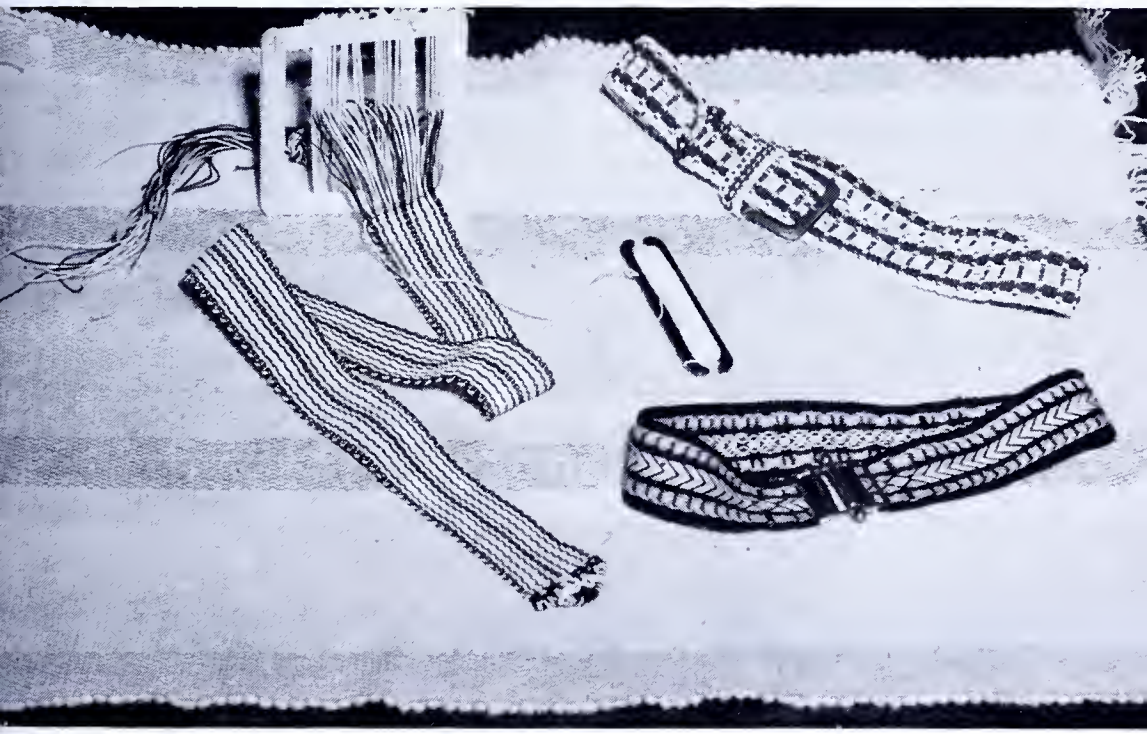
Instructional Materials

It is important to provide shop experiences which interest the pupils and create the desire to learn. The objectives, methods, procedures, and teaching devices must be planned and explained so as to emphasize that the shop is a place to *learn things* as well as to *make things.*

When shop work was first introduced into the public schools, teachers felt that it provided a means of escape from the "drudgery" of books. Consequently little use was made of written instructional

materials in the teaching of Industrial Arts. In recent years, however, since interest in the comprehensive general shop has increased, instructors are aware that the multi-activity shop can be taught more effectively through the use of instruction sheets. Because pupils have different backgrounds, interests, and abilities, written instruction sheets are of great value in giving specific directions quickly. They are also helpful in giving individual instruction where pupils progress independently at their own speed. Success in teaching Textiles as an Industrial Arts activity depends largely on proper planning of instruction and the development of instructional materials such as project sheets, information sheets, and operation sheets. Some additional advantages in using written instructional material are:

1. The teacher has more time to select instructional material and to arrange it in the best learning order
2. More accurate instructions are possible
3. The responsibility to seek out information is placed on the pupil
4. Accurate record-keeping and checking can be carried on easily
5. The teacher has more time for helping individual pupils



SAMPLE PUPIL PROJECT SHEET

INDUSTRIAL ARTS DEPARTMENT

_____ **School District**

PART 1—UNIT D: Weaving

1. Name_____ Grade_____ Section_____
2. Article to be made_____
3. Teacher approval___ Date___ Date begun___ Date completed___
4. Texture of article_____
5. Color of article_____
6. Prepare pattern or draft on reverse side. Teacher approval_____
7. Warp to be used_____
8. Weft to be used_____
9. Width of warp in inches _____
10. Threads per inch_____
11. Total number of warp threads (9 multiplied by 10)_____
12. Length of warp threads in yards_____
13. Total number of warp yards needed (11 multiplied by 12) _____
14. Total number of weft yards needed_____
15. Total cost of article_____
16. Steps of procedure. List principal steps in doing the job, showing what you do first, second, third, etc.

    a. _____

    b. _____

    c. _____

    d. _____

    e. _____

    f. _____

    g. _____

    h. _____

    i. _____

    j. _____

SAMPLE INFORMATION SHEET

INDUSTRIAL ARTS DEPARTMENT

_____ School District

PART 2—UNIT B: Textile Fibers and Yarns

INFORMATION SHEET NO. G-5

SUBJECT: Properties of Nylon

REFERENCES:

1. DuPont, *Nylon and You,* page 12
2. Johnson to Newkirk, *The Textile Arts,* page 100

FACTS ON NYLON:

Strength with Light Weight—The outstanding property of nylon is its unusual strength. Weight for weight it is stronger than steel wire. Nylon is not brittle and does not snap when knotted or bent. It is stronger and weighs less than any other commonly used fiber.

Wear and Tear Resistance—It is tough, pliable, and can take a great amount of rubbing, scraping, bending, and twisting without breaking. The smooth surfaces of the yarn cuts down friction when they rub together or against other surfaces.

Resilience and Shape Retention—Nylon will return to its original shape whether stretched or crushed.

Washability—Because nylon fibers are smooth, they do not soil easily and dirt can be removed quickly. Most nylon fabrics can be washed in warm soapy water or cleaned with a damp cloth.

Quick Drying—Some sheer nylon fabrics dry in a matter of minutes because much of the moisture is on only the outside of the nylon fibers.

Warmth and Coolness—A winter weather nylon sweater made of spun yarn can be warm yet light. The spun yarns can be woven fluffily with many tiny air pockets between the wavy fibers which keep the cold out and the warmth in.

On the other hand, a lightweight, sheer, open-weave fabric, made from filament nylon yarns, is cool because it allows free passage of air which picks up body moisture and heat.

Non-Flammability—When exposed to a flame, pure nylon melts, but it is normally self-extinguishing; however, some dyes, finishes, or other materials that manufacturers add will make it burn.

Resistance to Damage by Moths, Mildew, etc.—Normally, moths, silverfish, and other insects will not attack nylon fabrics. Mildew

may form on nylon, but it will not weaken the fabric. Water, perspiration, and standard dry cleaning agents also have no weakening effect.

Questions

1. Weight for weight, nylon is stronger than steel wire. *True* or *false?*
2. The surface of nylon is rough. *True* or *false?*
3. Once pressed, nylon will not return to its original shape. *True* or *false?*
4. Nylon does not soil easily like other fabrics. *True* or *false?*
5. Moisture penetrates nylon. *True* or *false?*
6. Nylon is a warm and also a cool fabric. *True* or *false?*
7. Nylon in its true state is self-extinguishing when afire. *True* or *false*
8. Mildew will not weaken nylon fabric. *True* or *false?*

SAMPLE OPERATION SHEET

INDUSTRIAL ARTS DEPARTMENT

_____ **School District**

Part 2—Unit B. Fibers and Yarns

Operation Sheet No. H-3

Operation: To Hand Card Wool

References:

1. Crowell, *Popular Weaving Crafts,* page 152
2. Gallinger, *The Joy of Hand Weaving,* page 12

Tools and Materials: Raw wool, set of carders

General Information:

Raw wool is usually matted and must be straightened. This is done by running the fibers between two spiked boards or cards, which removes small waste pieces of stem or dirt and spreads the fibers in smooth, even, fluffy layers or rolls. Label the carders, one for the right hand and one for the left hand. Always use the same carder for the same hand.

SAMPLE OPERATION SHEET (Continued)

Procedure:	Key Points:
1. Wash wool	
2. Dry wool fibers	
3. Place wool on teeth of left-hand card	*Place strands evenly and parallel to direction of pull.*
4. Grasp left-hand carder firmly	*Wool side up, rest on right knee.*
5. Grasp right-hand carder	*Hooked side down*
6. Comb the right-hand carder firmly	*Pull away from body.*
7. Repeat combing action	
8. Remove wool from card	
9. Place gently in box	

Shop Management Organization

As the activities presented in Industrial Arts shops are increased in number and scope, it is expedient for the teacher to assign some of the clerical, preparatory, maintenance, and routine duties to pupils. The purpose and the plan will vary according to the type of activity, size of the class, age of the pupils, length of periods, and the physical layout of the shop.

This cooperative plan is an effective device for achieving the following common Industrial Arts objectives:

1. To present practice in leadership and followership
2. To develop responsibility and a feeling of belonging to the activity
3. To motivate pupils' interest and understanding of industrial operations and applications
4. To aid the teacher in handling the many routine duties

The shop management activities should be planned and organized by the class. A teacher-imposed plan is readily recognized by the pupils, and has a tendency to destroy pupil interest. Better cooperation can be developed through a personnel plan developed by the pupils with teacher guidance. Pupils may assist in the development of the plan as a class or through a committee of pupils from several classes. A plan developed in this manner motivates the pupils' interest in industrial personnel organizations. A study of local plant systems by the pupils will be valuable in directing a well-organized plan for

the school. The extra time spent in the democratic development of this plan is more than compensated by the added cooperation attained and the guidance values received by the pupils. A plan for setting up a shop management organization is given on page 83 in Bulletin 331, *Industrial Arts in Pennsylvania,* September, 1951, Department of Public Instruction.

In order to make a shop management organization plan successful, the importance, need, and practicability must be explained carefully to the pupils. The success of the program depends entirely upon the pupils' acceptance. Therefore, the teacher should plan his presentation of the idea carefully in order to justify the value and need of such a program.

A PARTIAL CHECK LIST ON CARE OF THE SHOP

This check list may serve as a guide to the teacher and the pupil foreman in keeping the Textile Area functioning in good order.

	Yes	*No*
1. A place for everything	____	____
2. Everything in its place	____	____
3. Tables and equipment well arranged	____	____
4. Tools and equipment in place	____	____
5. Floor cleaned daily	____	____
6. Tables cleared of work and scraps	____	____
7. Bulletin board material changed frequently	____	____
8. Bulletin board orderly	____	____
9. Locker tops cleared	____	____
10. Teacher's desk orderly	____	____
11. Window ledges free of foreign objects	____	____
12. Blackboard clean or blackboard work constructive	____	____
13. Shop library in order	____	____
14. Sink clean	____	____
15. Supply closets orderly	____	____
16. Stock and project storage room neat and orderly	____	____
17. Cleaning brushes and brooms kept in storage rack	____	____
18. Window shades drawn to proper position	____	____
19. Windows closed at close of day	____	____
20. Pupil cooperation in keeping the shop in a neat and orderly condition	____	____
21. A pupil personnel plan for shop cleaning	____	____
22. Pupil shop organization properly posted	____	____
23. Machines cleaned properly	____	____
24. Jobs and projects properly marked and stored	____	____

4 Instructional Aids

BOOKS, BULLETINS, CHARTS AND EXHIBITS, MAGAZINES AND TECHNICAL JOURNALS, AND FILMS

IN A BOOK OF THIS KIND it is impossible to list all of the instructional materials in the form of books, pamphlets, study guides, charts, etc. Many instructors may be using excellent instructional aids not included here. This listing is not exhaustive.

Certain instructional materials are listed, however, with author, publisher, address of publisher, and an annotation of the contents, so that the Industrial Arts teacher will know what phase of instruction is included in each reference.

BOOKS

Allen, Edith Louise, *Rugmaking Craft.* Peoria, Illinois, Chas. A. Bennett Co., Inc., 1946, 96 pp., $1.85

An elementary book discussing the methods involved in making rugs with the simple hand tools and operations rather than with the loom. Covers processes involved in making flat-woven rugs and pile-woven rugs, in making rugs of interlaced material, sewing surface material on base, and working yarn or cloth strips through cloth mesh. Contains numerous photographs and drawings.

Brown, Harriette J., *Hand Weaving For Pleasure and Profit.* New York City, Harper & Brothers Publishers, 1952, 273 pp.

Written as an introduction and guide to those desiring to learn to weave with a minimum of personal instruction. Material is presented in the order in which processes are encountered in the weaving process. Attention is given to a well-illustrated discussion of special weaving techniques and types of weaving patterns. Other subjects include: the loom, loom accessories, threads and color, preparing the warp, fringes, knots, drafts, recognizing and correcting errors, how fibers are grown and spun into yarn, and the story of weaving. The appendix includes yarn size and yardage information and a glossary of weaving terms.

Brooks, Evelyn, *Your Textile Printing.* Peoria, Illinois, Chas. A. Bennett Co., Inc., 1950, 132 pp., $2.75

This book completely covers all phases of manual printing and dyeing of cloth with a minimum of equipment. Contains detailed methods of prcoedure and descriptions, technical information, and descriptions and diagrams of apparatus suitable for doing the work. Suggestions are given throughout the book for improvisations which will prove satisfactory. A chapter deals with the problems of design, suggesting how to obtain interesting and balanced patterns. Attention is also given to the study of color in relation to recipes and suggestions for preparing dyes and to the printing of fabrics.

Carroll, Alice, *The Good Housekeeping Needlecraft Encyclopedia.* Sandusky, Ohio, Stamford House, 1950, 479 pp. $4.00

This book for the beginning pupil gives instructions in all types of needlecraft and textile activities. Each chapter contains a brief discussion of basic material supplemented by step-by-step instructional procedure for doing specific projects. The written text is supplemented with 14 color plates and more than 1000 black and white halftone illustrations and line drawings which simplify the fundamental techniques. Instructions are given in simple sewing, advanced sewing and tailoring, simple and advanced embroidery, appliqué, quilting, patchwork and tufting, knitting, crocheting, netting, tatting, needlepoint, rug-making, weaving, and sewing for the home.

Collard, B. St. G., *A Textbook of Netting.* Peoria, Illinois, Chas. A. Bennett Co., Inc., 1948, 63 pp., $2.00

This is an elementary but comprehensive textbook giving clear explanations of the tools, materials, types of stitches, and kinds of knots used in net construction. The explanation is supplemented with numerous halftones of completed projects and line drawings showing "the run of the twine" in development of the various knots and meshes. The first two chapters discuss in detail the basic materials and operations such as: needles, mesh, twine, types of knots, stitches and netting, preliminary calculations, methods of starting various mesh, increasing, decreasing, and joining a new length of twine. The remaining chapters explain the processes involved in making the more advanced types of nets such as: square mesh, circular netting, and fancy pattern netting.

Crowell, Ivan H., *Popular Weaving Crafts.* Peoria, Illinois, Chas. A. Bennett Co., Inc., 1950, 166 pp., $2.00

Contents consist of an explanation of vegetable dyeing for beginners, procedure for making braided and interbraided rugs, inkle and box loom weaving, designing and making hooked rugs, finger and card weaving, cross-stitch and needlepoint, and hand-carding and spinning of wool. The emphasis is on the hand-operation activities or those accomplished with a handmade equipment.

Davison, Marguerite P., *A Handweaver's Pattern Book.* Swarthmore, Pennsylvania, M. Davison, 1947, 128 pp., $6.50

A modern, well-illustrated reference book of four-harness patterns for weavers of all types, whether beginner or advanced student. Contains 212 threading directions ranging from simple twills to more complicated techniques.

Di Bernardo, D. Joseph, *Making Your Home Furnishings.* New York City, D. Van Nostrand Company, Inc., 1952, 242 pp., $3.60

This book presents in detail information about upholstering, refinishing, and decorating in the home. The text is clearly written and is easily read. Special attention is devoted to chapters on how to judge and select fabrics, how to use and make slip covers, and how to use and make draperies.

Evans, Mary, *Fundamentals of Clothing and Textiles.* New York City, Prentice-Hall, Inc., 1949, 632 pp., $5.25

This reference book covers fundamental principles in the broad fields of textiles and clothing. Considerable attention is given to principles of clothing design and construction. Attention is also given to the problems of consumer concern in the selection and care of textiles, selection of ready-to-wear clothing, buying habits, stain removal, and clothing repair. Detailed discussion is given to various fiber

structures and characteristics, processes in spinning, the making of cloth, and tests for the identification of fibers.

Gallinger, Osma Couch, *The Joy of Hand Weaving.* Scranton, Pennsylvania, International Textbook Co., 1950, 306 pp., $4.25

This is a complete textbook showing the more difficult weaves and patterns in the processes of weaving. Part one deals with fibers and threads, their origin, history, and uses; part two teaches actual weaving procedures and techniques; and part three provides for advanced work in pattern-weaving. Italics have been used throughout the book to designate names of important parts and processes. The content is organized into thirty-seven distinct units supplemented with one hundred and forty-seven photographs and illustrations. It includes two chapters of practical projects for hand-woven fabrics, definitions of terms used in weaving, and a bibliography of textbooks, supply houses, periodicals, and bulletins.

Hand-Sewing Operations for Garment Making. Albany, New York, Delmar Publishers, 1951, 56 pp., $.95

A brief text giving objectives, introductory information, tools, equipment, and procedure for doing 17 of the basic elementary hand-operations in garment-making. Procedures are illustrated with line drawings.

Industrial Materials. Albany, New York, Delmar Publishers, 1949, 139 pp., $2.15

This book contains a series of suggested instructional units on the origin, characteristics, property, and manufacture of ten basic materials of industry. One of the subject areas deals with textile materials and covers such basic subjects as: textiles and you, textile terms, basic weaves, fabrics, King Cotton, linen, silk, wool, rayon, nylon, identification of fibers, and dyeing. Each unit provides an organized reference source for the teacher and a study guide for the pupil. The material is brief and written for secondary school reading. Units are developed in a uniform manner listing objective, introductory information, procedure, references, and assignments.

Johnson, William H., and Newkirk, Louis V., *Textile Arts.* New York City, The Macmillan Co., 1948, 144 pp., $2.00

An elementary book written specially for the Industrial Arts pupil on the junior high school level. The text is brief and supplemented with informative drawings and photographs showing fundamental processes as well as typical projects. Each chapter ends with discussion questions and a bibliography.

Lewes, Klares, and Hutton, Helen, *Young Rugmaking.* Peoria, Illinois, Chas. A. Bennett Co., Inc., 1949, 132 pp., $2.75

A book on the making of rugs from the simplest types requiring practically no equipment to those that must be woven on a loom. The text is written in simple language, illustrated with halftones and line diagrams. It contains sections on equipment, kinds and quantities of materials, dyeing, patterns, and drafts. Particular attention is given to loom-woven rugs, and rag rugs, with emphasis on color and design.

The Manufacture of Ready-To-Wear Clothing. Albany, New York, Delmar Publishers, 1944, 133 pp., $2.40

A book of clothing projects classified in first, second, third, and fourth year work. Each project lists new operations, tools and equipment, materials suggested, trade information, new vocabulary, health and safety, and visual aids. The book is designed for use in the pre-employment training of garment workers. However, the elementary projects are adaptable for Industrial Arts classes.

Occupational Handicrafts. Peoria, Illinois, Chas. A. Bennett Co., Inc., 29 leaflets, 12 to 16 pages each, $7.50

Contains 29 leaflets, each having 12 to 16 pages, giving information, instructions, and directions for making projects in such craft areas as caning, stenciling, glove-making, rug-weaving, netting, and knotting. Most leaflets list materials and tools required to make the article and they are well illustrated with half-tones and diagrams, some in color.

Parsona, L. E., and Stearns, John K., *Textile Fibers.* Scranton, Pennsylvania, International Textbook Co., 1951, 271 pp., $4.00

This reference book is a detailed guide to the study of raw materials and yarns used in the production of today's fabrics. The text is divided into four independent parts: cotton, wool, man-made fibers, and yarns.

Poulin, Clarence, *Tailor Suits the Professional Way.* Peoria, Illinois, Chas. A. Bennett Co., Inc., 1952, 192 pp., $4.50

A book of fundamentals for beginners which presents in understandable, simple language the operations a tailor follows in making garments. To avoid confusion, only one method of performing the various operations is presented. Operations are presented in a sequence suited to the needs of the beginner and are well illustrated with line drawings accompanied by concise step-by-step instructions.

BULLETINS

Alphabet of Wool Fabrics for Women's Wear, Pacific Mills, 261 Fifth Avenue, New York City 16

Art of Rug Making, The. Eaton Rapids Woolen Mills, Eaton Rapids, Michigan

Art of Rug Weaving, The. Mohawk Carpet Mills, 295 Fifth Avenue, New York City

A Brief Discussion of The History of Cotton, Its Culture, Breeding, Harvesting and Uses. The Louisiana State Department of Agriculture and Immigration, Baton Rouge, Louisiana

A Guide to Rug Buying. Alexander Smith & Sons Carpet Company, Yonkers, New York

A Story of Sewing, Leaflet No. 160. Lily Mills Co., Educational Department, Shelby, North Carolina

Better Cottons. Plant Industry Station, Beltsville, Maryland

Braided and Interbraided Rugs. Fellowcrafters, Inc., 13 Clarendon Street, Boston 16, Massachusetts. 20¢

Carpets and Rugs. Hoover Home Institute, The Hoover Company, North Canton, Ohio

Carpets—Their Selection and Care. Bigelow-Sanford Carpet Company, Inc., 140 Madison Avenue, New York City 16. 5¢

Cotton in Brief. National Cotton Council, P. O. Box 18, Memphis 1, Tennessee

Cotton in the Knitting Industry. National Cotton Council, P. O. Box 18, Memphis 1, Tennessee

Cotton on Wheels. National Cotton Council, P. O. Box 18, Memphis 1, Tennessee

Decron-Polyester Fiber. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware

Decorating from A to Z. Bigelow-Sanford Carpet Company, Inc., 140 Madison Avenue, New York City 16. 15¢

Design and Hook Your Own Rugs. Fellowcrafters, Inc., 13 Clarendon Street, Boston 16, Massachusetts. 20¢

Dictionary of Textile Terms. Dan River Mills, Inc., Dictionary Dept., 1407 Broadway, New York City 18

Directions for Using Textiles Colors. The American Crayon Co., Sandusky, Ohio

Easy Ways to Sew and Save. The Spool Cotton Co., 745 Fifth Avenue, New York City 22

Evolution of Woolen Cloth, The. Newell Textile Sales Company, Inc., 51 Madison Avenue, New York City 10

Fabric Guide. Pacific Mills, 261 Fifth Avenue, New York City 16

Fabric Decoration with Prong Textile Colors. American Crayon Co., P. O. Box 581, Sandusky, Ohio.

Facts About Bemberg Rayon Yarn. American Bemberg, 261 Fifth Avenue, New York City 16

Facts About Cotton, Leaflet No. 167. The Louisiana State Department of Agriculture and Immigration, Baton Rouge, Louisiana

Facts About Fabrics. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware

Felt Facts. Korbel and Colwell, Inc., 480 Lexington Avenue, New York City 17

Fire Resistant Textiles. National Cotton Council, 1832 M Street, N. W., Washington 6, D. C.

Hand Weaving. 1950, State Board of Vocational Education, Charleston, West Virginia

Here's How the Bemberg Tag Can Help You. American Bemberg, 261 Fifth Avenue, New York City 16

Home Dyeing with Natural Dyes. Miscellaneous Publication No. 230, Furry, M. S. & Viemont, B. M., U. S. Department of Agriculture, Washington, D. C. 5¢

How Acetate is Made, Leaflet No. 152. American Viscose Corporation, 350 Fifth Avenue, New York City 1

How Oriental Rugs and Textiles are Repaired and Restored. Nahigian Brothers, Inc., 169 N. Wabash, Chicago 1, Illinois

How Pearce Blankets are Made. Pearce Manufacturing Company, Latrobe, Pennsylvania

How Rayon is Made, Leaflet No. 151. American Viscose Corporation, 350 Fifth Avenue, New York City 1

How Sewing Thread is Made. Lily Mills Company, Shelby, North Carolina. 10¢

How to Do Stenciling No. 94-1. The American Crayon Co., Sandusky, Ohio

How to Put Rope to Work in Industry. Plymouth Cordage Co., North Plymouth, Massachusetts

How to Remove Stains. Good Housekeeping Institute, 57th Street at 8th Avenue, New York City 19

Instructions for Laundering Blankets. St. Marys Blankets, St. Marys, Ohio

Magic of Textiles, The. Pepperell Manufacturing Company, 160 State Street, Boston 2, Massachusetts

Man-Made Fibers. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware

Masslinn—Non-Woven Fabric. Chicopee Mills, Inc., 47 Worth Street, New York City 13

Mohawk Carpet and Rug Manual, The. Mohawk Carpet Mills, Amsterdam, New York

Navajo Native Dyes, their Preparation and Use. Bryan, N. G., and Young, S., Education Office, U. S. Office of Indian Affairs, Haskell Institute, Lawrence, Kansas. 50¢

Nylon and You. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware

Nylon Textile Fibers in Industry. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware

1001 Decorative Ideas, Book No. 9. Consolidated Trimming Corp., 27 W. 23rd St., New York City. 25¢

Prang Textile Colors. The American Crayon Co., Sandusky, Ohio

Rayon—A Major Textile Fiber. American Bemberg, 261 Fifth Avenue, New York City 16

Rayon and Acetate Today. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware

Repair of Clothing and Textiles. TM 10–267. Superintendent of Documents, Washington 25, D. C. 25¢

Romantic Story of Man and Wool, The. Pendleton Woolen Mills, Box 800, Pendleton, Oregon

Sew and Save. No. 169, The Spool Cotton Company, 745 Fifth Ave., New York City 22

Sewing Manual for Home Decoration, The. The Spool Cotton Co., 745 Fifth Avenue, New York City 22

Short Course in Rayon. American Viscose Corporation, 350 Fifth Ave., New York City 1

Silk Screen Printing on Paper and Cloth No. 14-2. American Crayon Co., Sandusky, Ohio

Slide Fasteners. Talon Educational Service, 420 Lexington Ave., New York City 17

Story of Cotton, The. Cluett, Peabody & Co., Inc., 10 E. 40th St., New York City 16

Story of Cotton Thread, The. The Spool Cotton Co., 745 Fifth Ave., New York City 22

Story of Thread, The. American Thread Co., 260 W. Broadway, New York City 13

Story of Worsted Yarns. National Spinning Co., Inc., 350 Fifth Ave., New York City 1

Upholstery Fabrics. Collins and Aikman Corp., 200 Madison Ave., New York City 16

Weaving Suggestions. Lily Mills Co., Shelby, North Carolina

What You Should Know About Rayon. E. I. DuPont de Nemours & Co., Wilmington 98, Delaware

Where to Get What. Penland School of Handicrafts, Penland, North Carolina. 25¢

Wool Primer. Botany Mills, Inc., Passaic, New Jersey

Wonderful Wool. The Wool Bureau, Inc., 16 W. 46th St., New York 36

Woven Floor Covering. Mohawk Carpet Mills, Amsterdam, New York

Your Woolens—Their Wear and Care. Botany Mills Inc., 16 W. 48th St., New York City 19

CHARTS AND EXHIBITS*

**Botany Mills Wool Exhibit.* Botany Mills, Inc., 16 West 46th Street, New York City 19

Columbian Knot Chart, The. Columbian Rope Company, Advertising Dept., Auburn, New York

**Cotton from Plant to Product.* (Display Kit). Pepperell Manufacturing Co., 160 State Street, Boston 2, Massachusetts

Cotton Panorama. National Cotton Council, P. O. Box 18, Memphis 1, Tennessee

Fundamental Sewing Stitches. Lily Mills Company, Shelby, North Carolina

How Felt is Made. American Felt Company, Glenville, Connecticut

How Nylon Comes to You. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware

How to Take Proper Care of Your Rope. Plymouth Cordage Products, Plymouth, Massachuetts

Mercerized Cotton—The Natural Fiber with a College Education. Durene Association of America, 350 Fifth Avenue, New York City 1

Nylon Fabric Review. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware

**Rope Samples.* Columbian Rope Company, Advertising Dept., Auburn, New York

Rope Specification Cards. Tubbs Cordage Company, 200 Bush Street, San Francisco 4, California

**Sample Cuttings, Style in Carpets and Rugs.* Klearflax Linen Looms, Inc., Duluth, Minnesota

Story of "Bemberg" Rayon Yarn, The. American Bemberg, 261 Fifth Avenue, New York City 16

**Textile Swatch Kit.* Swatch Kits, 100 Topia Drive, San Francisco 27, California

Wool Flow Chart. Textile World, 330 West 42nd Street, New York City

MAGAZINES AND TECHNICAL JOURNALS

American Fabrics. Quarterly. Reporter Publications, Inc., 350 Fifth Avenue, New York City 1

Handweaver and Craftsman. Hughes Fawcett, Inc., 115 Franklin Street, New York City 13. $4.00

Handweaving News. Monthly. Handweaving News, 12489 Mendota Avenue, Detroit 4, Michigan. $3.00

Knitter. Clark Publishing Co., Charlotte 1, North Carolina

Spinning and Weaving. Clark Publishing Co., Charlotte 1, North Carolina

Textile Age. Textile Age, Inc., 22 W. Putnam Avenue, Greenwich, Connecticut. $2.00

Textile Bulletin. Clark Publishing Co., 218 West Morehead Street, Charlotte 2, North Carolina

Textile World. McGraw-Hill Publishing Company, 330 West 42nd Street, New York City 36. $2.00

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* Exhibits.

FILM SOURCES AND TITLES

Along the Great Silk Route. General Motors Corporation, 1775 Broadway, New York City. 16 mm. and 35 mm., sound, 30 minutes. Free. Transportation charged both ways.

Botany Clothes The Nation. Botany Mills, Inc., 16 West 46th Street, New York City 19. 16 mm., sound, color, 40 minutes. Transportation charged both ways.

Civilization's Fabric. Fruit of the Loom, Inc., 15 Westminister Street, Providence, Rhode Island. 16 mm., silent, 25 minutes. Free. Transportation charged both ways.

Cotton—From Mill to Finished Product. Society for Visual Education, Inc., 1345 West Diversey Parkway, Chicago 14, Illinois. 35 mm., film strip, 25 minutes. $2.75 rental charge. Transportation charged one way.

Facts About Fabrics. University of Kansas, Bureau of Visual Instruction, University Extension, Lawrence, Kansas. Sound. $1.00. Transportation charged both ways.

How Rayon is Made. (677-7) Audio-Visual Aids Library, The Pennsylvania State University, University Park, Pennsylvania. 16 mm., sound, 15 minutes. $1.25 service charge. Transportation charged both ways.

King Cotton. DuPont Semesan Co., 101 W. Tenth Street, Wilmington, Delaware. 16 mm., and 35 mm., sound, 12 minutes. Transportation charged both ways.

King Cotton. General Motors Corporation, 1775 Broadway, New York City. 16 mm. and 35 mm., sound, 19 minutes. Transportation charged both ways.

King's Other Life, The, (677-2) Audio-Visual Aids Library, The Pennsylvania State University, University Park, Pennsylvania. 16 mm., sound, color, 20 minutes. $1.25 service charge. Transportation charged both ways.

Loom Weaving. Brandon Films, Inc., 200 West 47th Street, New York City 19. 16 mm., sound, 10 minutes. Rental $2.00. Transportation charged both ways.

Making Cotton Clothing. (677-1) Audio-Visual Aids Library, The Pennsylvania State University, University Park, Pennsylvania. 16 mm., sound, 10 minutes. $1.65 rental charge. Transportation charged both ways.

Rayon—A New Frontier of Progress. American Viscose Corporation, 350 Fifth Avenue, New York City. 16 mm., 37 minutes, sound. Free. Transportation charged both ways.

Science Spins a Yarn. Audio-Visual Aids Library, The Pennsylvania State University, University Park, Pennsylvania. 16 mm., sound, 23 minutes. $1.25 service charge. Transportation charged both ways.

Spinning Wheel. Ambrosch Film Productions, P. O. Box 98, Glendale 5, California. 16 mm., sound, 10 minutes. Rental $1.50 a day. Transportation charged both ways.

Story of Wool and Botany Clothes the Nation, The. Director of Education, Botany Mills, Inc., 16 West 46th Street, New York City 36. 16 mm., color, sound, 25 minutes. Free. Transportation charges.

This is Nylon. E. I. DuPont De Nemours & Co., Wilmington 98, Delaware. 16 mm., sound, color, 29 minutes. Transportation charged one way.

What is Cloth. (677-4) Audio-Visual Aids Library, The Pennsylvania State University, University Park, Pennsylvania. 16 mm., sound, 10 minutes. $1.65 rental charge. Transportation charged both ways.

Wool. (677-5) Audio-Visual Aids Library, The Pennsylvania State University, University Park, Pennsylvania. 16 mm., sound, 11 minutes. $1.65 rental charge. Transportation charged both ways.

Yarn and Cloth Construction. (677-3) Audio-Visual Aids Library, The Pennsylvania State University, University Park, Pennsylvania. 16 mm., sound, 10 minutes. $1.65 rental charge. Transportation charged both ways.

5 Equipment and Supplies—

MACHINERY AND SUPPLY LISTS

In this Section the teacher will find suggestions and ideas for the selecting and ordering of hand tools, machine tools, and consumable supplies. Suggestive lists of tools, equipment, and supplies are also included.

How to Select Equipment

The board of school directors and supervising principal or superintendent of schools must look to the Industrial Arts teacher for technical advice in the selection and ordering of shop tools and equipment. Recommending new equipment to replace obsolete or worn-out equipment and the ordering of hand tools and consumable supplies, require forethought and sound judgment, if the teacher is to win and retain the respect of his superiors. No two schools have the same budget, physical plant, or educational program; therefore, all planning of tools, equipment, and supply needs must be made to fit local needs and resources.

A few guiding principles to be followed in selecting equipment and supplies may be summarized briefly as follows:

1. Does the equipment have definite application in carrying out the objectives, scope, and content of the course of study?
2. Will the shop serve junior, senior, or both high school groups?
3. What activities will be taught?
4. Is the size of the class proportionate to the physical plant?
5. What funds are available?
6. Is the equipment suitable for the space available?
7. Is the equipment mechanically designed for safety under ordinary operating conditions?

How to Specify and Order Equipment and Supplies

Having determined the exact kind of tools and equipment which he needs to carry out his educational program and having selected the specific size, capacity, and type of each item, the teacher is faced with the problem of ordering these items in such a way that he will receive exactly what he has spent so much thought in selecting.

_____ HIGH SCHOOL

INDUSTRIAL ARTS DEPARTMENT

Tool and Equipment Specification List, 1953-54

Item	*Quantity*	*Unit*	*Catalog No.*	*Name and Description of Item*	*Unit Cost*	*Total Cost*
1	1	ea.		Loom, weaving, four-harness, 8″ x 15″ long x 10½″ wide, x 13″ high, pressed steel construction with lacquer finish. Equipped with 240 heddles, one 15-dent reed 8″ long, two 9″ flat fiber shuttles, one steel-warp beam, one draw-in hook, one cloth beam, two 9″ lease sticks	22.50	22.50
2	1	ea.		Shears, pinking, 6″	5.00	5.00
3	1	ea.		Winder, bobbin, wall-type	6.00	6.00

Shop instructors should request on school stationery manufacturers' and distributors' catalogs covering the items under consideration. Complete descriptions, specifications, and numbers may be secured from these catalogs to help define the item needed.

Each item on the specification sheet or order sheet should list all necessary information (See page 44). Items should be listed uniformly and should contain the following:

1. Item number
2. Quantity desired
3. Unit of measure
4. Catalog number
5. Name and complete description of item—size, color, and accessories
6. Cost

Specifications should ordinarily be written around the specific piece of equipment which comes closest to the teacher's requirements. In this case write the words "or equal" following the item, or include the phrase in "Instructions to Bidders."

How to Keep a Shop Inventory

Many different methods of keeping an inventory are used by Industrial Arts teachers. The type and form used depend somewhat on the local school organization. The important factor is that the Industrial Arts teacher is responsible to the administrative official of the school for a periodic, accurate accounting of all shop tools and materials. The advantages of keeping an accurate inventory are many, including:

1. A periodic check on the condition and quantity of tools and materials
2. Information at all times as to how much stock is on hand
3. Accurate information concerning the amounts used during the term
4. Basis for determining amounts needed for the new term
5. Justification for quantities requisitioned

A suggested inventory form is shown on page 46. Each item should be listed, giving as complete a description as possible. Near the close of the school term the purchasing official of the school will furnish for the *Received During School Term* column, the quantities of new items purchased during the current year. This information can easily be secured from the purchase orders. At the close of the school year the teacher checks and lists quantities in the column *On Hand at End of Term* or in one of the *Expended* columns. Then the quantities are checked against quantities listed as being on hand on the inventory of the previous year, and any discrepancies are checked.

SAMPLE INVENTORY FORM

FOR EQUIPMENT OR SUPPLIES — TEXTILE AREA

_____ SCHOOL DISTRICT

INDUSTRIAL ARTS DEPARTMENT

Inventory of _____

Instructor _____ School Year _____

On Hand Beginning of School Term	*Received During School Term*	*Totals on Hand*	*EXPENDED*			*Transferred*	*On Hand at End of Term—1953-54*	*Description of Items*	*Unit Cost*	*Total Cost*
			Broken	*Worn Out*	*Lost*					
4	6	10		3		1	6	Brush, stencil, 1" long, 1/4" wide	.20	1.20
2							2	Card, wool, steel wire	1.50	3.00

Tools, Machinery, and Equipment

The kind and amount of equipment selected for any shop activity depend mainly on the size of the class, the grade level of the pupils, the type of activity to be taught, and the extent to which the activity will be taught. Equipment is usually considered to be machines, tools, and auxiliary aids that are not consumed in the finished product.

The tools, other equipment, and supplies recommended in this bulletin are based on the minimum requirements in Textiles for five pupils in a comprehensive general shop. Quantities of equipment can be increased or decreased according to the emphasis given to the subject or to any particular area of Textiles instruction.

Where a particular manufacturer's name is specified, it should not be assumed that the product is preferred or recommended over another manufacturer's product. It is used only to illustrate needed materials and equipment and as a standard of type and quality.

Consumable Supplies

The supplies necessary for any shop activity depend mainly on the size of the class, grade level of the pupils, degree of emphasis given to Textile instruction, and the type of projects and processes included in the teacher's plan of instruction. There is also variation in types, quality, and price of yarns and other textile supplies; therefore, it is difficult to estimate the kind or quantity of supplies which might be used in a particular shop situation. It is suggested that shop teachers secure catalogs, samples, and prices of materials from supply houses.

Storage and Control of Tools, Supplies, and Projects

The storage arrangement for best control of tools is through the use of tool panels on which tools are hung in sight of the pupils and teacher. The panel is fastened to the wall and contains the tools normally used in the particular work area. The panel has a light background on which is painted a silhouette of each tool. This method of storage saves time for the pupil in obtaining and returning tools and facilitates the teacher's task in checking them. Additional suggestions on tool control can be found in *Industrial Arts in Pennsylvania,* Bulletin 331, Department of Public Instruction, pages 91-93.

Providing storage space for consumable supplies is an important

factor in the planning of building facilities for Industrial Arts education. The comprehensive general shop ordinarily requires a dry and well-lighted room for the storage of supplies and projects. This room should contain storage shelves approximately one or two feet apart to facilitate proper storage of supplies and projects. The small box-type lockers are also adaptable for pupil project storage.

A SUGGESTED LIST OF HOUSES OFFERING TEXTILE EQUIPMENT AND SUPPLIES[1]	*Rug Yarn*	*Knitting Machines*	*Looms*	*Wool Yarn*	*Wool Weaving Yarn*	*Complete Yarn Supply*	*General Supply*
American Handicrafts Co., Inc., 45-49 S. Harrison St., East Orange, New Jersey	..	..	..	..	..	..	X
Ainslie Knitting Machine Co., 738-750 Grand St., Brooklyn 11, New York	..	X	..	..	..	..	.
Bartlett Yarn Mills, Harmony, Maine	..	..	..	X	..	..	.
Colonial Yarn House, 1231-33 Cherry st., Philadelphia 7, Pennsylvania	..	..	..	X	X	..	..
Cliveden Yarns, 711 Arch St., Philadelphia 6, Pennsylvania	..	..	..	X	..	..	..
Contessa Yarns, P. O. Box 336, 3-5 Bailey Ave., Ridgefield, Connecticut	..	..	..	..	..	X	..
Coventry Yarn Mills, South Coventry, Connecticut	..	..	..	X	..	..	..
Emile Bernat & Sons Co., 89-117 Bickford St., Jamaica Plain, Massachusetts	..	..	..	X	X	..	..
Hand-Skill Looms, Inc., 59 Social St., Woonsocket, Rhode Island	..	..	X	..	..	..	..
Hand Weaving Yarn Co., P. O. Box 7145, Elkins Park, Pennsylvania	..	..	..	..	X	..	.
Hughes Fawcett, Inc., 115-117 Franklin St., New York City 13	X	..	X	..	X	X	.
January & Wood Co., Maysville, Kentucky	X	..	..	..	..	..	..
J. L. Hammett Co., 380 Jelliff Avenue, Newark 8, New Jersey	..	..	X	..	..	..	X
Newcomb Loom Co., Davenport, Iowa	..	..	X	..	..	..	..
Structo Manufacturing Co., Freeport, Illinois	..	..	X	..	..	..	..
Sunray Yarn House, 349 Grand St., New York City 2	..	..	..	X	X	..	..

[1] This is not a complete list of Supply Houses offering equipment for the Textile Area. The above list is included only for the convenience of the Industrial Arts teacher.

EQUIPMENT, MACHINERY, AND TOOL LIST

MAJOR EQUIPMENT AND MACHINERY

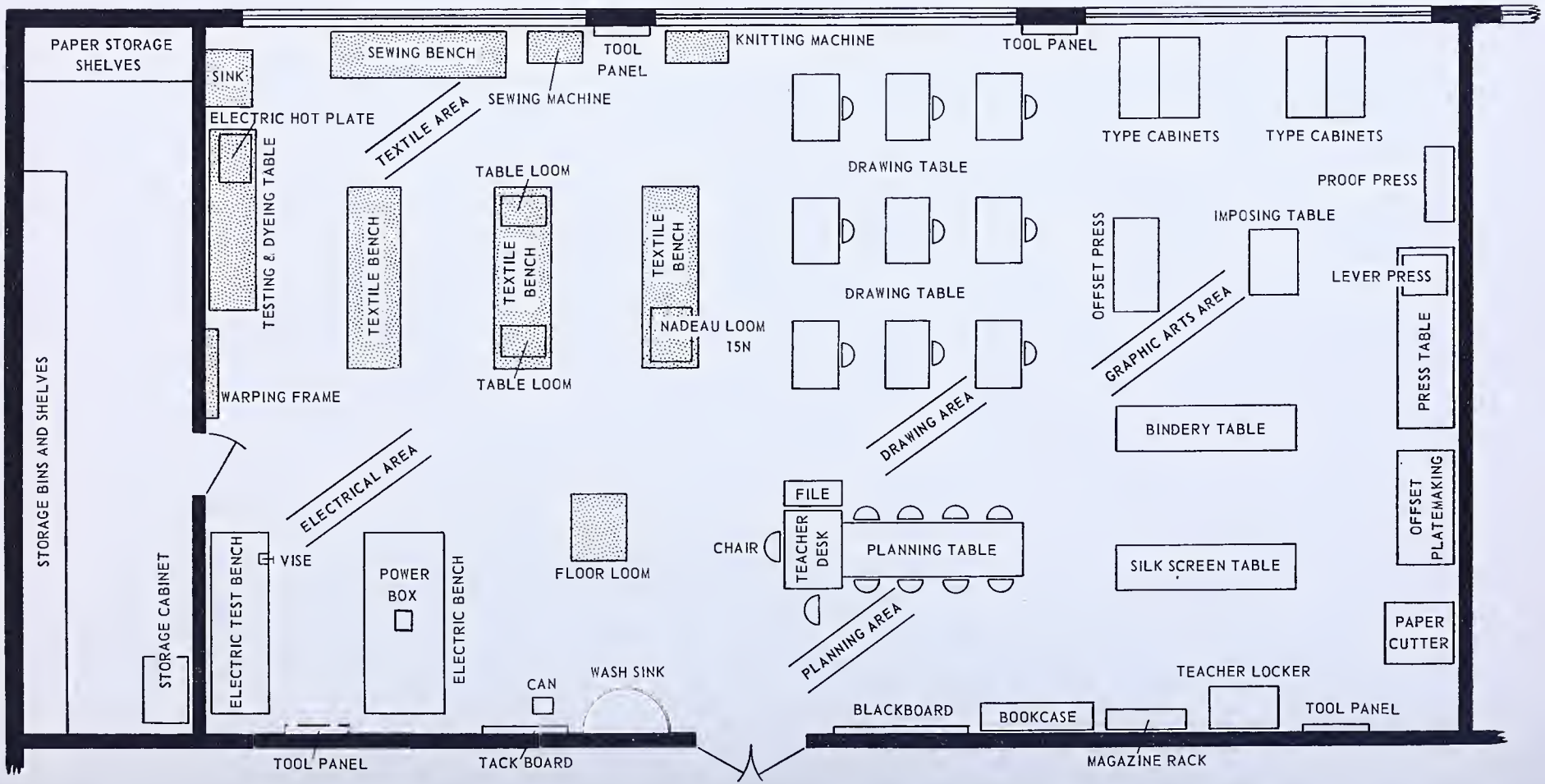
Quantity	*Item*	*Approximate Cost*
4	Looms, weaving, four-harness with 8″ weaving space. 15″ long x 10½″ wide x 13″ high, pressed steel construction with lacquer finish. Equipped with 240 heddles, one 15-dent reed 8″ long, two 9″ flat fibre shuttles, one steel-warp beam, one draw-in hook, one cloth beam, two 9″ lease sticks. Table model	$90.00
6	Looms, weaving, four-harness with 20″ weaving space. 24″ wide x 20″ long x 19″ high, hardwood construction, natural finish. Equipped with 600 eight-inch heddles, one 15 dent reed 20″ long, two 22″ flat wood shuttles, two 22″ fibre lease sticks, one steel-warp beam with ratchet and crank, one draw-in hook, one flanged wood-warp beam with ratchet and crank, one flanged wood cloth beam. Table model	450.00
*1	Knitting machine, Auto-Knitter, hand-operated. Model C, 4½″ diameter, 100-needle cylinder, 50-needle dial, complete with yarn winder, bobbins, extra needles, hose board, counting attachment, lamp, and instruction book	158.00
*1	Knitting machine, hand-operated, flat type, 7 needles per inch, 16″ needle bed with standard accessories including comb, buckle, weights, yarn stand, extra needles, and instruction book. Also equipped with single lock, short carriage, supporting stand, cardigan and side locks, hand rack, counter, and two carriers for stripes or sectional work	285.00
NOTE:	The above machine can be purchased in 5, 7, and 8 gauge and 8″ to 24″ bed space.	
1	Sewing machine, electric, rotary action console style with forward reverse stitch regulator, stitch-length regulator, lamp, extra bobbins, extra needles and air-cooled motor for 110-220 volts, 60 cycles, AC current	135.00
1	Loom, 38″ weaving capacity, 4-harness, 23″ high, 24½″ deep, 43½″ long. Aluminum tubing construction with hand wheel head motion with 8 rows of 4 holes as harnesses. The following standard equipment included: 1 reed, one 14″ shuttle, 1 warp beam, 16 indicator pins, 800 heddles, 1 heddle hook, 2 clamps, 1 pair temple hooks with springs, 1 special loom tool, one instruction book. Naudean Loom Model 15 N	185.00
1	Loom, four-harness with 45″ weaving space, hardwood construction, natural finish, 12-dent reeds, foot treadles, 800 heddles, warp beam, reed hook, shuttles, spool racks, and steel beam for ready warped spools	115.00
1	Spinning wheel	50.00
	Total	$1,468.00

* Only one type required.

Exhibit of Woven Scarves

Quantity	*Item*	*Approximate Cost*
	Brushes	
2	stencil, 3/8" diameter	$.40
2	stencil, 1/4" diameter	.40
1	Brayer and Tile, rubber	4.00
1	Bobbin winder, wall-type	6.00
2	Cards, wool, steel wire	3.00
	Clamps	
2	"C," 3"	2.00
2	"C," 4"	2.50
2	"C," 5"	3.40
2	parallel, 4" jaw	3.60
2	parallel, 6" jaw	4.30
2	parallel, 8" jaw	5.00
1 set	Cutters, linoleum, five cutters, one handle	1.00
1	Drill, hand, 3/8" capacity	5.50
1	Hammer, claw, 13 oz.	2.25
2	Hooks, rug	.70
1	Iron, electric, automatic heat control, 4 lb., 110 volt, 60 cycle AC	13.50
1	Ironing board, metal, folding legs 15" x 54" x 32"	7.00
2	Knives, stencil, 1" long, 1/4" wide	1.00
	Mesh sticks	
2	wood, 3/4"[1]	—
2	wood, 1"[1]	—
	Needles	
2	netting, brass, 1/4"	.50
2	netting, wood, 3/4"	.50
12	milliner, No. 7	.25
12	milliner, No. 9	.25
1	Netting board[1]	—
1 lb.	Pins	2.00
1	Pliers, combination, 6"	.60
2	Rug-hooking frames[1]	—
	Rules	
2	wood, 12" legnth	2.00
1	wood, 24" length	1.35
1	Skein winder	9.00
1	Saw, coping	.82
	Scissors	
2	6"	4.50
1	8"	2.75
1	10"	4.00
	Screwdrivers	
1	4" blade	1.20
1	8" blade	1.40
2	Spool racks	15.00
2	Warping frames	14.00
1	Warping reel	18.00
2	Yardsticks	.30
2	Warp tension boxes	16.00
2	Tape measures	.70
	Wrenches	
1	crescent adjustable, 6"	1.10
1	crescent adjustable, 8"	1.35
	Total	$163.12

[1] Constructed by pupil or teacher.


PAPER STORAGE SHELVES
SINK
ELECTRIC HOT PLATE
TESTING & DYEING TABLE
WARPING FRAME
STORAGE BINS AND SHELVES
STORAGE CABINET
SEWING BENCH
SEWING MACHINE
TOOL PANEL
KNITTING MACHINE
TOOL PANEL
TEXTILE AREA
TEXTILE BENCH
TABLE LOOM
TEXTILE BENCH
TABLE LOOM
TEXTILE BENCH
NADEAU LOOM 15N
DRAWING TABLE
DRAWING TABLE
DRAWING AREA
TYPE CABINETS
TYPE CABINETS
PROOF PRESS
IMPOSING TABLE
OFFSET PRESS
GRAPHIC ARTS AREA
LEVER PRESS
PRESS TABLE
BINDERY TABLE
OFFSET PLATEMAKING
ELECTRICAL AREA
ELECTRIC TEST BENCH
VISE
POWER BOX
ELECTRIC BENCH
FLOOR LOOM
FILE
CHAIR
TEACHER DESK
PLANNING TABLE
PLANNING AREA
SILK SCREEN TABLE
PAPER CUTTER
CAN
WASH SINK
TEACHER LOCKER
BLACKBOARD
BOOKCASE
TOOL PANEL
TOOL PANEL
TACK BOARD
MAGAZINE RACK

6 Shop Layout

THE PHYSICAL SETUP

Industrial Arts Shop Facilities are part of the secondary school building. It is difficult to prepare standard shop layouts because the architectural plan and the specific activities incorporated in a shop may vary.

The layout shown here is an Industrial Arts shop area including Planning and Drawing, Graphic Arts, Electricity, and Textiles. To distinguish it from other areas, the textile area is shaded in the drawing on page 52. The above are companion areas because they are not dust-producing activities. If other activities are substituted to meet the needs of the local school, the textile activity either should be incorporated in the Planning Area or surrounded by glass.

An enclosed planning area is not incorporated in this plan because all areas involved are relatively free from excessive dust and dirt, and because planning is done in the Drawing and Planning area which is a major shop activity.